IAVE

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

— W. A. Krueger Co.

A profile of the graphic arts industry with guidelines for teachers
(see page 42)

- How Much to Teach in Industrial Arts?
- Integrating Science, Mathematics, and Industrial Arts, Doutt and Scriven
- Looking Ahead to the 1960 AVA in Los Angeles

December, 1960

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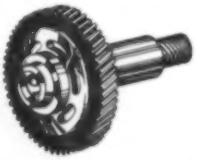

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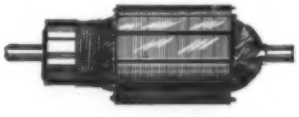

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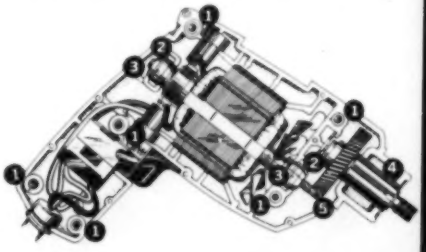

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IA/VE

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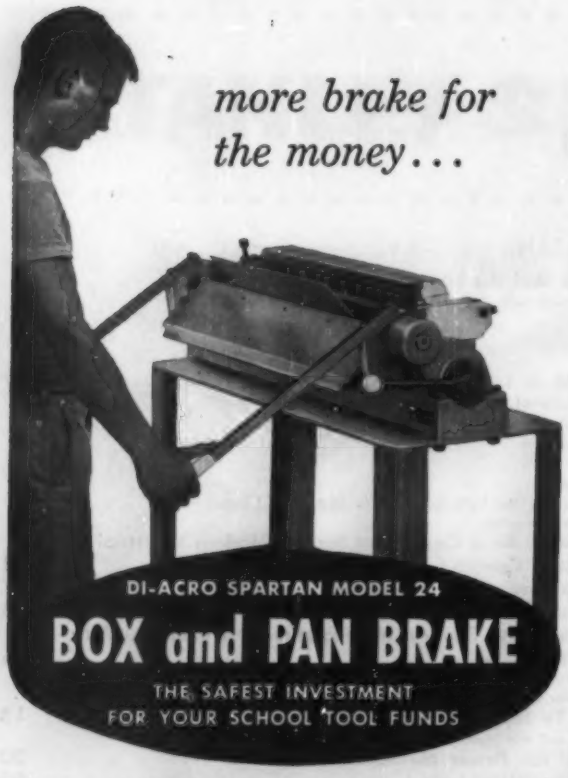

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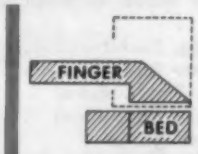

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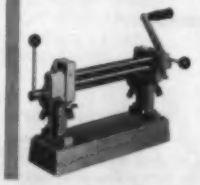

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18

42

your IA/VE for December

Prominent trends in **the broad, expanding area of graphic arts** are spotlighted in your IA/VE for December with a trio of articles which we believe will interest you:

1. A **profile** (pg. 42) **of the industry of graphic arts** which discusses trends, mechanical developments, manpower needs, and the implications of these on the teaching of the subject.

2. An **article** (pg. 25) **on how one district has shaped its vocational printing curriculum** by analyzing local industry.

3. A **checklist** (pg. 54) **of ideas on how your schools can observe Printing Week**, which is scheduled for January.

On other subjects, there's a wide range of topics treated, which include:

1. **How much to teach?** Two authors (pp. 12 and 13) offer widely differing concepts of the balance of instruction in skills and related information.

2. **Integrating science, mathematics, and industrial arts.** One program (pg. 15) in junior high school which coordinates basic space-age instruction in these three "technical" subjects.

3. **Closed-Circuit TV.** What are its possibilities for boosting the work of the industrial educator is answered in a report (pg. 18) on recent research in this volatile and promising aid.

There's also **another installment of our series on power** — the first article, in your IA/VE for November precipitated a veritable flood of comments. If you're planning to attend **the AVA in Los Angeles** this month, you will enjoy looking through our **preview** (pg. 26) **of what's scheduled at the meetings.**

There are, of course, **articles on improved practices in industrial education — and please don't forget the 11 project ideas** (pg. 28 ff) in metal, wood, electricity, drawing, etc.

for January...

The concept of team teaching, or grouping of instructional efforts for improved presentation, is gaining ground rapidly in secondary schools and your IA/VE for January will **report on one experiment in industrial education.**

the editors

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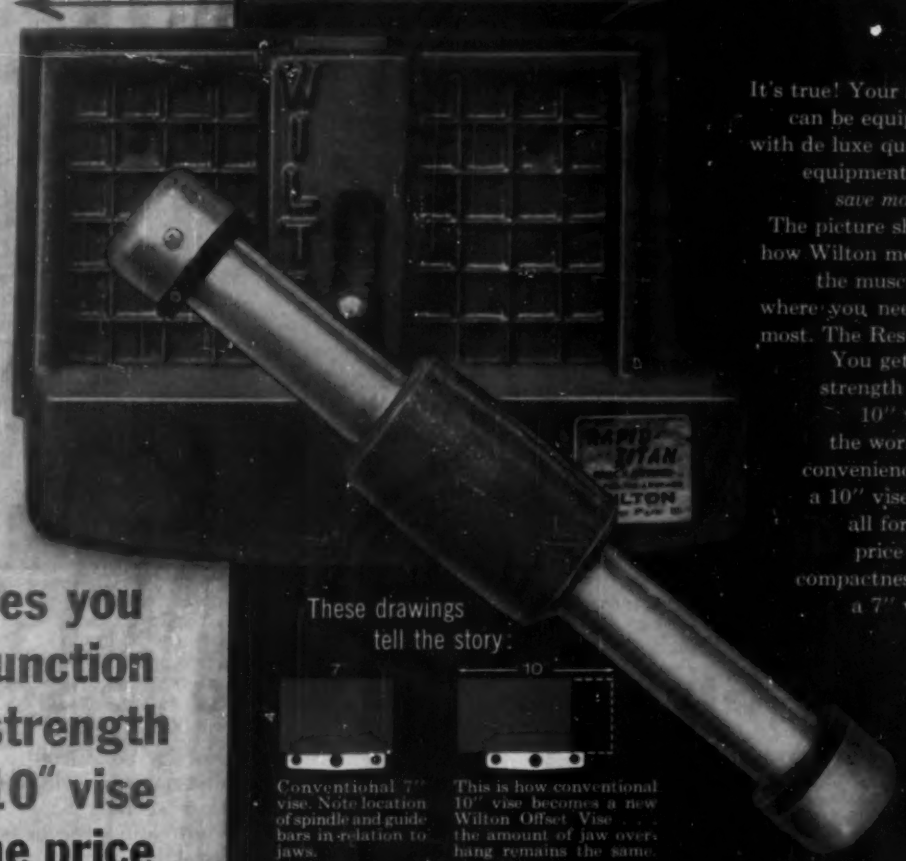

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letters

for more voc-ed

Having completed over 30 years in industrial arts and vocational education with the last 14 in correctional vocational education, I must comment on your opinion poll considering the major purpose of shop work in the senior high school (see pg. 12 of your IA/VE for October). I have the feeling that the percentage returns on the opinion poll are inconclusive, that the random sampling is not representative, and that a question such as this merits a survey that could be considered valid and reliable. Such "crash" reports as presented may distort the real facts. While I cannot subscribe to the conclusions of the report I do heartily support your proposed platform for greater emphasis in industrial education during the ninth through the twelfth year.

One cannot be associated with industrial education in a penal institution without being cognizant of the importance of vocational skills to incarcerated men. Approximately 85 per cent of our men failed in school to get the trade competence necessary to participate in free society and to be competent to assume their share of responsibility to our national economy. Of many contributing factors the need to terminate education beyond high school has been the basic problem of institutional populations.

We have returned to the 3R philosophy in education. Now let's provide opportunities for youth to acquire an employable level of skill in the high school program of studies for those masses who can not continue in our upper division offerings.

Industrial arts and industrial education supporters could do well to avail themselves of opportunities to visit and observe the activities of their penal institutions. I feel that they will become impressed with the importance of more and better vocational education at the high school level.

L. G. Wines, Supervisor of Vocational Instruction; Department of Corrections, California Institution for Men.

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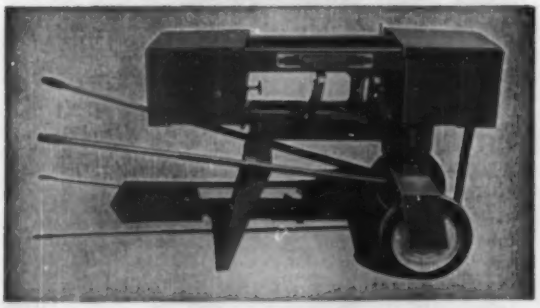

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news

D. C. anti-dropout program The Washington, D. C., school district officials are considering a program to keep dropouts off the streets and place them on jobs or in training programs. Over 1000 youths a month drop out of D. C. schools. If counseling services fail to prevent dropouts, the district's department of vocational rehabilitation wants to establish a new services division that would include training courses for the unskilled dropout. Counseling services would find the job best suited to each youngster's potential and also help him adjust to community living. Estimated cost of the program would be $75,000, most of which would go for salaries of a division chief, three counselors, and two clerks.

Texas I. A. proposals Proposed changes in public school industrial arts programs in Texas have been submitted by study committees to the state board of education. Proposals recommend that a minimum of one fifth of a student's class time to be devoted to theory, study, research, and similar activities, that classes be limited to 25 pupils, and that the teacher load be not more than 125 pupil periods in a six-period day or 150 in a seven-period day. Other proposals include the recommendation that 17 courses now approved (such as baton twirling and music appreciation) be discontinued and that all industrial arts courses be taught daily for 18 weeks minimum.

technical education program in Ohio Several new technical education programs have been initiated in Ohio. The first post high school technical program to be conducted by the public schools in the state was operated last year by the Baberton schools in mechanical engineering technology. Three other cities in Ohio are adding post high school technician programs: Cleveland, Lorain, and Salem will initiate them. Salem is working on a co-operative employment plan with industry, in which students will go to school for 12 weeks and then work 12 weeks in selected industries.

industrial-vocational program at Southern Illinois To produce trade competent vocational teachers who understand educational theory and hold a college degree, the co-operative vocational-industrial trade teacher education program at Southern Illinois University has been developed. The first two years of the

(Concluded on page 46)

"He keeps muttering something about sow's ears and silk purses."

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the editor's stand

INDUSTRIAL EDUCATION AND THE LIBRARY

The library is a strange and unfamiliar place to many of our industrial education students. Even some of our own shop teachers seem to find little need to use the library. What a tragedy! The world of books and other resource materials can open new vistas of interest to the boy enrolled in shop classes. The library is one of our greatest sources of help in the fourth "R" of education — research, both practical and theoretical.

Industrial education has so much solid content that it would seem an impossible task to teach an effective course without making use of the resources of the library. Yet, a perusal of several high school and city libraries reveals that the stock of books in industrial education and those relating to occupations and the industrial world is woefully meager. Why is this? Is it because the librarian doesn't know her job? Is it because she is ignorant of the field of industrial education? Hardly likely. Usually there are two good reasons.

First, the average librarian is more familiar with books and other materials related to the academic field. She naturally buys what she knows best. However, the second and most important reason is that many shop teachers do not make specific requests for books and materials, nor do they expect their students to use the library. It is our responsibility to request continuously the best new materials in our field for the library. Most librarians have a very adequate budget for new books and materials. If we make our requests known, we'll get our fair share; *but we must ask*. We must know what we want and need in the library.

Here are some of the resources that we, as industrial education teachers, should have in our libraries:

1. Texts and auxiliary reference books

All good technical textbooks, including copies of the basic textbook, should be in the library. These should supplement but not replace the basic textbook that is in the hands of each student.

2. Handbooks

Such standard reference handbooks as *The New American Machinists Handbook, The Machinery Handbook, The Plastics Handbook,* and others of this type should be available.

3. Technical and trade magazines

We should make sure that the magazines provided in the library include many more than just *Popular Science* and *Popular Mechanics*. Every library should have such magazines as *Interiors* and *Industrial Design*. In addition, there should be one or two good trade magazines from each technical area. For example, in metalworking, a good one might be *The American Machinist — Metalworking Manufacturing*.

4. Professional magazines and books

The library ought to be equipped with a copy of every professional book and with each of the good professional magazines.

5. Government publications

Such items as *The Occupational Outlook Handbook, Forests and Trees, General Drafting,* are typical of the many Army, Navy, Air Force, and Agricultural Department publications that can be tremendously useful to your students. Are *you* on the mailing list of the U. S. Government Printing Office?

6. Special encyclopedias and dictionaries

There should be in the library at least two technical dictionaries and a good set of special encyclopedias such as the new one on science and technology for reference work.

And so it goes. There are so many, many more that could be added to the list. One thing is certain. If the librarian finds that we are interested in what can be found in the library, she will begin to order items of interest to us even without our asking; but we and our students must show an interest in the library first.

How long has it been since you browsed through the library? When was the last time that you put in a specific request for a new book or magazine? You might be surprised at the high degree of co-operation you receive if you ask and keep on asking. Not just once, but many times. Find out how and when new library materials are ordered. Give the librarian a copy of the book catalog from each of the major publishers in our field. Make a specific request for a professional book or magazine. And there are, of course, the many other services available through interlibrary loan. Doctoral theses on microfilm can be rented or purchased by the library. Industrial displays can be obtained from the Library of Congress. These are only a small sample of the many helps offered by the library.

All of us should get better acquainted with our school and city libraries. It's a better shop teacher who can tell his students where and how to find materials on a research topic or report. There is a side benefit, too. You'll be most gratified to see how the industrial education program will grow in the esteem of the librarian and the other teachers when you and your students "make friends with the library." ◀

John L. Feirer

how much to teach

One of the very vital issues in the field is how far the industrial arts pendulum should swing between skills and related information . . .and here are two widely differing viewpoints: (1) a program for consumer values as a core topic and (2) a plea for a renaissance of craftsmanship (equated with manual training) —

Consumer Values: As a Core Topic for the Modern Industrial Arts Program

JOSEPH CAPUTO

"A core topic . . .around which all shops would function . . . could be in the re-emphasis of consumer values."

If your industrial arts laboratories seem to be in the doldrums, or the whole shop program gives one the impression that each shop teacher is off to the wild blue yonder, some hard reappraisal may be necessary to bring them back to terra firma. A core topic must be found around which all shops would function within their particular area. This core topic might be as strong as a hawser line or as thin as gossamer silk. Whatever its tenuous quality it would still serve as a cohesive amalgam, thus strengthening the "togetherness" about which we hear so much. A topic that would help in this direction could be in the re-emphasis of consumer values.

In this age of spiraling costs and prohibitive prices, it is important that we teachers of industrial arts place considerably more emphasis on the teaching of consumer values than we have in the past. Since only a handful of our students go to trade schools, it would be wiser to channel more of our efforts into teaching them how to be more discriminating users of the products they have learned about in our industrial arts laboratories. The student who writes a good report about "trends in teenagers' clothes" or "cake mixes" will remember her research a long time. A visual aid of assorted "printing papers" made by a student will be a memorable event, and a radio or electronic project made at home may be the turning point in that child's life.

We cannot hope to train connoisseurs but we certainly can teach our children to be more discerning in their future purchases. By placing more emphasis on the teaching of consumer values in all our shops, the students will be cognizant of the importance of this effort. We too can profit from this objective because our shop planning will have a continuity of related information in at least one area similar in all shops.

Mr. Caputo is chairman of the industrial arts department and an instructor of graphic arts, Junior High School 190, Forest Hills 75, N. Y.

Content for Courses

Topics for lessons on consumer values can be taken from existing shop courses. It would only be necessary to refer to areas in occupational guidance, avocational sources, and consumers' knowledge. A knowledge of industry will help any student in the possible selection of a career. Statistics prove that our shops really influence children in their selection of an occupation. After completing an industrial arts course many stu-

(Continued on page 14)

Related Information: The Monster That Is Sucking the Lifeblood From Industrial Arts

ROBERT A. HENRY

Mr. Henry teaches woodworking at the Conroe, Tex., High School.

"Let us get back to the grass roots of industrial education . . . out of the classrooms . . . back to craftsmanship."

According to the advocates of related information any industrial education activity that includes craftsmanship should be buried in an unmarked grave with the hope that few people will remember that it ever existed. It is the writer's opinion that a more appropriate ceremony could be conducted at this grave site by reading the last cold rites over related information as a traitor to the cause of the craftsman.

This article is presented in defense of the few who still remember the word craftsmanship, the few who do not spend their time preparing and presenting a boasting, bragging, flowery-type course description, hoping that people will be impressed to the degree that they will say, "My, what a fine fellow; he was hired to teach woodworking but he is so brilliant and gifted that he is teaching every phase of human learning known to man."

It is very difficult to understand why the leaders in our profession are striving so diligently to eliminate craftsmanship from the schools. If any one thing has been instrumental in building this nation, it is craftsmanship. We can build things better and faster than any other nation. The people who are performing these feats of wizardry, most likely, did not waste their formative years studying related information.

Craftsmen Are Needed

It is considered a very conservative estimate to say that for every scientist and engineer graduating from college there should be at least 12 mechanics and/or technicians. If industrial education is turned into a classroom subject, where in this "beat-the-Russians" world are we going to find people who have had some experience in using their hands to enter a program designed to carry out the ideas of the scientists and to build the missiles to the specifications of the engineering drafting boards? They will not be found in the related information classes or in the specialized vocational classes. They will come from the industrial education classes where the student *should* get a variety of experiences in manual training.

The only apparent reason that readily comes to mind for this moronic related information merry-go-round is the fact that it is so easy to sit in a classroom that a majority of the people connected with the halls of learning have adopted that method of *pretending* to teach industrial education. As a result we have a group of people with teaching certificates in their pockets and a red rose in the lapel, going out to teach industrial education without knowing the difference between a dado joint and a jackass. They can regale you with the minutiae surrounding the field trip or quote the page number of a book containing a picture of a table saw, but if asked to turn on this saw and cut a rabbet joint, big trouble develops. The unfairly duped, red rose-bedecked victim of this farce is not at fault. The schedule by which he enrolled listed industrial education; it made no mention of oratorical mishmash. After he has been forced to sit in a classroom throughout his college career and at the end of four years has been handed a slip of paper saying he is qualified to teach industrial education, how can he be expected to conduct his classes in any manner other than one similar to that in which he was taught? The question is rhetorical, of course.

Equipment for a Lecture Course

Some schools have an investment in excess of $250,000 in industrial education. No one, either living or dead, through the spoken word or the written, will ever convince the writer that it is good business or good sense to turn an investment of this magnitude into a lecture course consisting of math, science, philosophy, psychology, history, marriage counseling, sandpile, and all other phases of education that can be taught in the regular classroom.

If industrial education teachers could ever become conscious of the fact that we are not heaven's gift to all humanity, that we do not have intelligence enough or ability enough to teach every aspect of man's operations, we would become, as we should be, manual training teachers, very little *more*, nothing *less*. Should this fact ever become recognized, we will have taken the first big step away from the current absurd presentation of industrial education, the attempt to justify our laziness or lack of ability in craftsmanship by calling it related information. Millions of words have been spoken praising the importance of related information and an equal number of words have been given over to degrading the project. Yet the very individuals who prepare and deliver these orations, when wanting to pre-

(Concluded on page 14)

related information...

sent their departments in the most propitious light, will invariably bring a project for display. You have yet to see or hear of even one who has brought a student to a meeting and allowed him to get up before a group of people and brag about all the valuable information he has acquired in the field of related information. Why do they operate in this peculiar fashion? Probably because deep in their hearts they know the project is still the most important part of industrial education. They just do not have guts enough to admit it because it is not the popular thing to say.

The opinion is advanced here that before related information should enter the industrial education picture, it is best to know the subject to which you are relating it, that is, craftsmanship, safety, tools, and machines.

It is predicted that one day when we least expect it the taxpayers of this nation will become aware of the money they are wasting buying expensive tools and machines which are allowed to rust away in expensive buildings while industrial education teachers spend their time in classrooms studying some book, or taking some field trip that resulted in nothing more than a holiday for the students, or performing some insignificant lab experiment of a semi-scientific nature.

To the Grass Roots

A study is being conducted in Texas at the present time titled "A Grass Roots Study of Texas Schools." Let us get back to the grass roots of industrial education, off the highways, out of the classrooms, back to the shop, back to craftsmanship, back to *Manual Training*, if you please. If we could only recognize that by far the most important thing ever to be derived from a course in industrial education is knowledge of craftsmanship, safety, tools, machines, and the completion of a useful project. Just because we rarely turn out an accomplished mechanic is no reason for our hiding behind a book, a field trip, or a classroom door.

It is requested that the reader of this article not construe that we are of the opinion that ours is a model industrial education department, rather that we are striving and hoping to teach our students something about craftsmanship, the thing of primary importance in the *building* of this nation. ◀

...consumer values

dents do actually develop hobbies relating to their shop experiences. We all know of many students who spend a great deal of time at home on woodworking projects, radios, bookbinding, and many other skills learned in our industrial arts laboratories. Children learn quickly to distinguish quality products and well-designed articles when given this instruction in our shop courses.

The final achievement of this concentrated effort should culminate in comprehensive reports, visual aids, such as graphs, products of industry, step-by-step procedures, assembly-line production, or articles made at home emphasizing good design and quality. Photography enthusiasts turn out fine movies and portraits illustrating industrial products and processes. We are not concerned primarily with decorative pieces, designed with an eye toward supervisors but with the actual work done by the students themselves.

It is only necessary that we prepare a short series of topics on consumer values and relate them to everyday living. Eight lessons would be sufficient for a worthwhile project. Anything beyond this number would depend on the time already scheduled for related information lessons and the shop class in attendance. The following suggestions for the various industrial arts areas could serve as a guide.

Display: a By-Product

The use of consumer values as a core subject for industrial arts laboratories can bring out a wealth of material for display purposes. The resulting charts, visual aids, and projects can be gathered together to form a tremendous showcase of industrial arts achievement to be displayed in an auditorium, large classroom, or possibly store windows and bank lobbies. This whole program can be carried a step forward and include the co-operative efforts of the academic subject teachers. In this way the talent of the school body would be on display for the enrichment of the entire community. Many merchants would be glad to display these projects to further consumer education. ◀

topics for a consumer values core

GRAPHIC ARTS

1. Selecting a career from facts learned in the graphic arts shop.
   a) Occupations in commercial printing, newspaper publishing, book publishing, advertising.
2. Personnel employed by the printing industry.
   a) Preparation for skilled and semi-skilled jobs, education needed, age, physical requirements.
3. Products of graphic arts industry.
   a) Books, magazines, newspapers, calendars, tickets, catalogs, posters, letterheads.
4. Recognition of good design and quality printing.
   a) Principles of design: balance, harmony, color, appropriateness; paper and printing inks.
5. Factors to consider when buying graphic arts products.
   a) Method of duplication: letterpress, intaglio, lithography.
   b) Kinds of illustrations, paper, ink, type, color; folded, padded, stitched.
6. Proper care and use of printed products.
   a) Care and storage of books, magazines, as reference materials.
7. Selecting and buying equipment for graphic arts hobbies.
   a) Local printing supply stores, art stores, craft shops, are sources for prices and materials.
8. Projects that can be made at home with homemade equipment.
   a) Linoleum block presses and tools, bookbinding, silk screen, etchings, wood cuts.

GENERAL WOODWORKING

1. Selecting a career from facts learned in the general woodworking shop.
   a) Occupations in the building industry, furniture and cabinetmaking, boatbuilding.
2. Personnel employed by the woodworking industries.
   a) Preparation of skilled and semi-skilled woodworkers.
   b) Apprenticeship training, education needed, age, physical requirements.
3. Products manufactured by the woodworking industry.
   a) Furniture, cabinets, store fixtures, containers, houses, millwork.
4. Recognition of good design and quality workmanship.
   a) Principles of good design applied to harmony of surroundings, balance, unity and color; usefulness.
5. Factors to consider when buying woodworking products.
   a) Functional design, strong joints, well-seasoned wood, fine varnish or lacquer finish.

(Concluded on page 52)

a program for integrating Science, Mathematics, and Industrial Arts

RICHARD F. DOUTT and ELDON G. SCRIVEN

With the increased emphasis on science and technology which is taking place in our society, it becomes imperative for schools to examine their present curriculum programs related to these areas. In some areas discovery and invention have led to new fields of study, notably plastics and synthetics in industrial arts and nuclear energy and biochemistry in the sciences. As the results of these discoveries filter down to the consumer, it has resulted in a broadened economy. In addition new industries have sprouted, demanding more skilled personnel for operation and research. To meet these increasing demands for more skilled people, our schools must be prepared to give the students a firm background in those subjects which contribute to these kinds of skills. It is best if this training begins early. This may be done by presenting opportunities in which students can acquire and develop those qualities which have proven to be important for success in industrial research and technology.

Mr. Doutt (left) is industrial arts supervising teacher and Mr. Scriven is mathematics-science supervising teacher at the University School, Northern Illinois University at DeKalb.

The world we live in today is an interesting one, and is becoming more so. Those courses which deal with the technological aspect of our society should also be interesting, since it is the fruit of these areas which are contributing so much to the general growth of our standard of living. Science and technology of today, as taught in our schools, need not be just a series of lessons. It could be developed in a way which interrelates school subjects in a meaningful, correlated approach. This will demonstrate for a student the importance

- Correlating the school subjects which mirror the technological aspects of our society is necessary to **acquaint students with a full dimensioned view of the world** in which they will live and work.

- Here is a description of such **an integrating program** on the junior high school level — the level on which the authors believe such instruction should begin — **which provides experimental research** in the combined subject areas.

of being well rounded in the field of industrial arts and the sciences.

A suitable place to begin this type of approach is in the junior high school. Students are receptive, are beginning their formal study of science and industrial arts, are curious, are questioning new ideas to which they are introduced, and are interested in why things happen. All these characteristics make for fertile ground on which to cultivate those qualities needed for successful living.

Beginnings of this philosophy have been attempted in various schools throughout the country. An interesting program is being conducted at Montgomery Hills Junior High School under the direction of Dr. Donald Maley, head of the industrial education department, University of Maryland, and Alan P. Keeny, industrial arts teacher at Montgomery Hills Junior High School. The program is developed around research and experimentation in the industrial arts laboratory.[1] Another program of interest, taught by Anne E. Nesbit, a science teacher at South Junior High School, Pittsfield, Massachusetts, gives the students an opportunity to conduct exploratory research in various scientific problem areas.[2]

An Experimental Course

An experimental research course is being developed at the University Junior High School, Northern Illinois University, DeKalb, Ill., for the 1960–61 school year. The course is being planned around science, mathematics, and industrial arts at the eighth-grade level. It will be taught in a three hour block of time and will be given to students in lieu of regular departmentalized courses in these three subjects. The research is planned within several phases.

This combined subjects approach to math, science, and industrial arts will result in:

1. More meaningful learning with a high rate of achievement.
2. Increased interest in the three subjects.
3. A broader understanding of scientific concepts by using the problem solving approach with the application of math and industrial arts.
4. A better understanding of the methods of learning through research, experimentation, and analysis of collected data.

One of the phases consists of the teaching of subject matter. Since the course is being given in lieu of the regular departmentalized courses, care must be taken in the initial planning to insure that the students will have the knowledge other eighth graders will have upon completion of their regular courses. The plan is to have science as the basic subject, with mathematics and industrial arts being used to aid in the experimentation and proof of various science topics studied. Mathematics will be used in data collecting, recording, analyzing, and evaluating from which conclusions can be drawn. Industrial arts tools and techniques will be utilized to give students a chance to build, test, and experiment with simple apparatus. In so far as possible, students will be encouraged to pursue their own ideas as long as the ideas will contribute to the knowledge of the topic under investigation. Emphasis will be placed upon actual investigation and study of *scientific concepts* in an experimental approach. It is expected that some students, possibly all students at times, will need to concentrate in mathematics or science or industrial arts apart from the other two subjects. This is certainly expected in the field of mathematics where extra drill, practice, and application will be needed.

Testing Procedure

Another phase consists of establishing a testing program which will

energy

a typical unit developed for use in the research course as one approach to the integration of the subjects

Concept A: If the degree of heat of matter is determined by movement of molecules, then as molecules of a substance are heated, the molecules will move faster, increasing the space between them, and causing expansion of the substance.

Team Research Experiment: The testing equipment for this experiment can be made by the students using shop facilities. This would present opportunities for teaching the following typical lessons in industrial arts: layout, gluing, drill press, drilling and countersinking, setting wood screws, assembly, sanding, finishing, jig saw, soldering, ferrous metals, nonferrous metals, wood, and use of various hand tools. Once the equipment is made, students can gather data on the expansion of different metals having different shapes. Upon fitting each kind of metal into the test rack, apply heat, and measure expansion per unit time. The data may be recorded on graph pictures. Once the above data has been gathered, an analysis should be made and the results of this analysis applied to the concept under study. A further evaluation can be made by graphing the results on regular graph paper. Superimposed line graphs can be made for different metals, thus effectively picturing and comparing results.

Concept B: Materials having different colors absorb or reflect heat at different rates.

Team Research Experiment: This experiment gives plans students may use to demonstrate this concept. By timing the minutes needed to melt the wax on the outside of the colored metal plates after heat is first applied, comparisons can be made between color and heat absorption. The data may be recorded on the table. Typical industrial arts lessons from this activity can be layout on metal, drilling metal, shaping metal on the slip rolls, cutting metal with tin snips, the squaring shear, filing metal, paint, bending metal, how metals are made, and use of various hand tools.

Concept C: Knowledge of heat energy is widely used in industry.

Group Reading and Discussion: Each of the above concepts have implications for and use in industry. Students may read and discuss these implications. Following are a few applications around which discussions may center: bridge construction, cooking utensils, heat control (thermostats and thermopiles), road and railroad construction, and casting.

Details of Concept "A"

Tools and Machines

1. sandpaper
2. drill press
3. twist drills
4. screw driver
5. jig saw
6. belt and disk sander
7. soldering copper

[1]Donald Maley, "Research and Experimentation in the Junior High School," *The Industrial Arts Teacher*, 18: 12–16, Mar.–Apr., 1959.

[2]Anne E. Nesbit, "Ninth Grade Science Research," *The Science Teacher*, 26: 113–117, Mar., 1959.

aid in interpreting the results in light of the hypotheses which have been postulated. Plans are to test aptitude, interest, and achievement. A battery of tests will be given at the beginning and at the end of the course. An evaluation of test results will be used to partially determine the success of the research experiment. Also an evaluation of the course will be partially determined by comparing the results of the experimental group with the results of a control group of eighth-grade students who will be taught a departmental program of science, mathematics, and industrial arts. They will receive the same battery of tests and will receive the same concepts taught in the experimental group but taught in a standard departmental subject program. The control group involves the third phase of the program.

Students in the experimental class will be given seminar-discussion type opportunities during which they will discuss their work, their activities, and their results. Planning for future activity, self-evaluation, and development of topic planning will also be involved in the seminar critiques. Field trip planning, guest speakers, and research people in the fields being studied will also be utilized. This will constitute the fourth phase.

The units around which the research program will be organized are units typical of junior high science. Units in the field of energy, work and power, weather and climate, space and time, and areas of biology are planned.

It is planned that in addition to self, group, and class evaluation conducted in conference and seminar meetings a more formal system of testing will be conducted as units unfold and are completed. It is planned to give formal tests of a type which will involve using ideas, methods, and concepts learned to solve a new thought problem. This will result in a stimulation of student's thinking processes through explaining concepts similar to those studied in the unit, but applied to a new activity or demonstration.

Materials

1. 3/8" x 2¾" x 12¼" wood base
2. 1½" x 2¾" x 3¼" wood support
3. 1½" x 1¾" x 2⅞" wood support
4. ⅜" x 1½" x 2¾" wood support base
5. 2 — #8 x ¾" RH wood screws
6. 4 — #6 x ¾" FH wood screws
7. 1/16" x 1½" x 1¾" plastic
8. sewing needle
9. 3" — 20 gauge copper wire
10. 2 — #18 x ¾" wire brads

Procedure

1. secure materials
2. glue stock for supports
3. lay out for holes in base
*4. have work checked
5. drill holes in base — 3/16" bit
6. countersink holes for flat head screws
7. attach support base to small support with wire brads and glue
*8. have work checked
9. lay out for screw holes in supports
*10. have work checked
11. drill holes — 7/32" bit
12. sand all parts smooth with sandpaper
*13. have work checked
14. assemble supports to base with flat head screws and glue
*15. have work checked
16. apply a finish — see wood finishing panel in finishing room
17. attach plastic with glue to small support
18. attach scale to small support
19. solder copper wire pointer to sewing needle eye
*20. have work checked

Purpose

1. Determine to what degree different shapes and kinds of metal will expand when heat is applied directly to the metal.

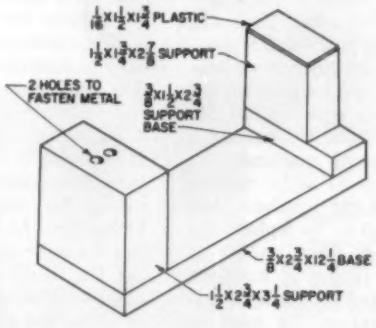
Equipment

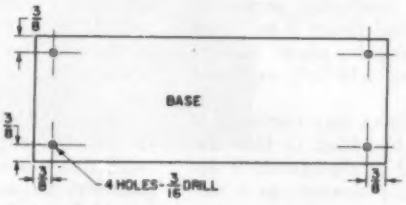
1. metal expansion testing apparatus
2. metal — different kinds and shapes
3. heat source

Procedure

1. attach metal to apparatus
2. apply heat
3. take reading
4. repeat steps for various shapes and kinds of metals

Material	READING AT 30 Sec.	1 Min.	1½ Min.	2 Min.	2½ Min.	3 Min.	3½ Min.	Total Expansion
Steel								
Aluminum								
Nickel Silver								
Copper								





Data sheet (left) and equipment plan (above) for metal expansion phase of energy unit.

Try Closed-Circuit TV for Better Industrial Education

ERNEST B. PARRY

▶ Educational television, in only a few years of experimentation, has indicated its potential in improving the instructional process.

▶ **What does it offer for industrial education?** Here is a report on **recent research** with the closed-circuit variety which **highlights how its applications can assist the shop teacher.**

Direct-wire television is not a new gimmick, a Johnny come lately. It has been used successfully for some time by industry for various applications. It has been used effectively by banking houses to scan checks for signature verifications, by industries to monitor industrial machines, by railroad companies to assist routing agents in reading car numbers, and by department stores to replace the gardenia bedecked floor walker to monitor for shop lifting. It has been used in medical and industrial situations to some extent for training physicians and production personnel. As an educational device it has been slower in finding its place. Its application has yet to be fully exploited in schools.

In essence direct wire television is closed circuit television in that the signal produced by the camera is not sent out over the airways but is carried via a direct wire to the receiver or monitor. In its present form the equipment is simple, easy-to-use, and easy-to-maintain. This writer had his first experience with utlilizing the equipment this summer and had no difficulty in gaining basic proficiency in applying it to the classroom situation. Maintenance can be performed locally by any qualified television technicians. In fact, any television receiver can be connected to the camera via the direct wire and used as an additional monitor. This would assist an interested school board in lowering the initial investment by approximately $200 if a receiver is already available. The basic camera, with wide angle and telephoto lenses, tripod, dolly and lense adapters should represent an investment of less than $1,000. From this writer's experience with direct-wire television this past summer, he would say the money would be a wise educational investment if the equipment were fully utilized.

Just how is this particular application of television intended to be integrated with a normal classroom or laboratory procedure? First, it should be emphasized that this highly portable equipment is designed for use by the individual instructor. Any teacher who can operate a film projector can operate the direct-wire television equipment. When this fact is accepted, then the application of this medium of communication to classroom procedure opens wide avenues of approach to the varied presentation of industrial arts subject matter.

Illustrations of Applications

Several lessons of utilizing the television equipment were presented to college grade students where objects discussed were too small to be seen by more than three or four students at one time. These objects were telecast on the monitor with the instructor and the equipment located in front of the class. Two camera settings were used, a wide angle view of all the objects on the bench top and a close-up view showing individual items; the camera settings being adjusted by the instructor presenting the lesson. The reactions of the group toward this method of instruction were recorded by using a follow-up questionnaire. Ninety-five per cent of the group indicated that the use of direct-wire television blended in smoothly with the lesson and 88 per cent indicated that the close-up views were of value in gaining better understanding of the prin-

Mr. Parry is an instructor in the department of industrial arts, Northern Illinois University, DeKalb.

ciples and subject matter involved. However, the use of other visual aids to be projected on the monitor should not be overlooked as good teaching technique. This technique was applied several times and the respondents indicated by their questionnaires that 84 per cent of them felt that the visual aids were most beneficial in helping them learn the subject matter involved. Seventy per cent felt that the use of these aids without the benefit of television would have been insufficient.

In a different application the drafting instructor utilized the equipment to assist in demonstrating a complicated sheet metal development. The monitor was placed in the front of the class while the instructor was located at the rear of the classroom. The use of television enabled the instructor to demonstrate the procedure with the drafting instruments where hitherto he had to rely on a chalk board demonstration that was, at its best, only indicative of the precision necessary for accuracy. As indicated by the questionnaire, 75 per cent of the class group indicated the close-up views were helpful in gaining better understanding while 29 per cent responded that they were somewhat helpful. There was no response to the negative. Fifty-seven per cent of the group indicated that they could not have understood the principle as well without the use of close-up views while 28 per cent indicated that they could have. It is extremely interesting to note that not only this lesson, but all lessons present with direct-wire television were presented in a normally lighted classroom. The reaction of 89 per cent of the respondents in all situations indicates that room lighting did not interfere to any extent with their vision of the monitor. Normal room lighting allows for normal visual teacher control of the group, a distinct advantage not to be overlooked.

A Machine Procedure

A final example of the versatility explored this past summer was the use of television in demonstrating a machine procedure where it is impossible to group more than five or six persons where they can observe what is being demonstrated. This particular situation occurred three times in the following demonstrations, a drill grinding demonstration, a machine lathe tool bit grinding demonstration, and a wood turning demonstration. The writer presented these lessons, and it was the first time in his limited experience that he felt he was reaching successfully all of the class at one time. The camera settings were shifted from over-all views of the grinding wheel and reset to close-up shots showing how to hold the twist drill or cutter bit, in relation to the wheel, telephoto shots of the angles, rakes, and clearances produced by grinding.

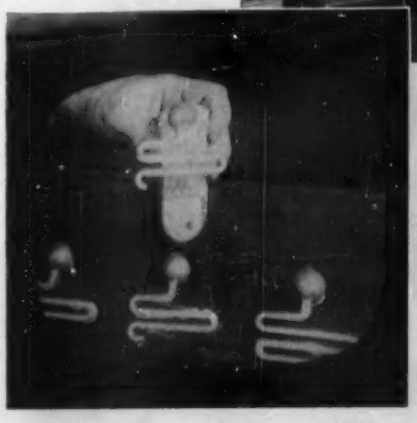
In the case of the wood lathe demonstration camera settings ranged from a wide angle view to show how to properly grasp the lathe tools, to close-ups showing the shape of various tools and their cutting action, to telephoto shots showing the results that scraping and cutting actions have on fiber structure of the wood. It would be proper here to mention that at no time may any person be in a position of danger in relation to the machine. It was possible for all students to stand well away from the wood lathe and still observe both the instructor and the monitor which were located in their field of vision.

Limited testing was attempted with control groups, one group receiving instructions utilizing an assist with television and the other receiving instruction without this medium. It would be erroneous to attempt any scientific findings based on these results because of limited time, material, group selection, and group size. No significant differences were observed from this procedure.

Classroom utilization of direct-wire television can offer a great assist to the instructor and the pupils. Teaching is more apt to be inspiring, purposeful, and meaningful through better preparation of material. Clearer and more concise understandings are indicated by students who have been exposed to this medium of communication. The ingenuity of the shop instructor in putting this teaching device to use will determine to a great extent the effectiveness of classroom television. Its implementation at various grade levels and in different subject matter areas is visualized as a natural situation needing exploitation. As research progresses with television being used as a mass communicative teaching medium, a greater abundance of scientific data will be available in determining its worth. However, using it as a visual aid in the classroom situation does not have to await this type of research. The individual teacher can use the equipment, evaluate results, improve his instruction, and get a noticeable assist from direct-wire television.

— University of Illinois

One of the outstanding advantages of TV to the industrial educator: the magnification of close-up views for large groups of students.



How the TV cameras highlight a casting demonstration in a college-level foundry laboratory for large-group viewing.

▶ The second in a series of five articles on our most rapidly emerging new instructional area —

Suggested Content For Power Mechanics

CHARLES G. RISHER

The over-all purpose of power mechanics, regardless of the school level or the industrial arts laboratory organization in which it is offered, is to enable the students involved to gain a comprehensive knowledge of the various energy forms and of the units which convert this energy into usable power. The efficient acquisition of this information relating to energy forms and their power applications will necessitate that students have available to them organized instruction in power mechanics, taught in a developing power mechanics laboratory. Because power mechanics is in its embryo stage, the word *developing* is used intentionally. As new energy sources are developed, and usably organized, written instructional material becomes available, power mechanics offerings will become increasingly broadened. These newly developed and uniquely adapted energy forms, and the devices for converting these into usable power, will be included in its instructional content.

Dr. Risher is an assistant professor of industrial education at Western Michigan University, Kalamazoo.

In providing information relating to energy forms and power units, power mechanics will provide both laboratory units. Power mechanics instructional experiences and technical information about today's energy converting power content will include: energy sources, design features, construction materials, production processes, operating principles, practical maintenance, and teacher guided experimentation and research. In addition to these, relevant occupational information, related mathematics and science, consumer information, and practical safety precautions will also be included.

Instruction and Experiences

From this instructional content, it is immediately obvious that teaching the technical information will require a far greater percentage of instructional time than has been the traditional pattern of industrial arts laboratory instruction. This is as it should be. The very broadness of the intellectual and technical information content of power mechanics will require that approximately half the instructional time be utilized for those learning experiences in which students can only participate by study, research, or by visual or auditory means.

The remaining half of the instructional time will be applied to laboratory experiences in power mechanics. This time will be utilized for such varied learning experiences as disassembly and assembly for the purpose of understanding *how* and *why* machines and devices function, experimentation to develop laboratory demonstration apparatus, experimentation with commercial demonstration apparatus or the application of practical maintenance procedures. The planning of these activities will be stimulated and guided *during initial* phases by the instructor, but the actual time spent for planning will be utilized as homework outside the laboratory.

For a beginning power mechanics area, the laboratory experiences will most practically center around the small gasoline engines of the power lawn mower, kart, and outboard marine variety, and consumer automobile maintenance. These are readily available and laboratory experiences involving these will require few tools and little equipment in addition to that usually found in an industrial arts laboratory worthy of the name. Because the primary concern at this time is the initiation of the power mechanics program, the course content suggested here will be that which is capable of implementation with a minimum of additional tools and equipment. We can here only suggest instructional content for power mechanics. The application of this content will depend upon the imagination and ingenuity of the power mechanics instructor.

Look for the third installment of Dr. Risher's series on power mechanics, which will consider the available resource material for this area, in your IA/VE for January, 1961.

suggestions for course content in power mechanics

I. An Introduction to Fuel Engines

A. Internal combustion engines
   1. Gasoline engines
   2. Diesel engines
   3. Jet engines
   4. Rocket engines

B. External combustion engines
   1. Steam engines
   2. Steam turbines

II. Small Gasoline Engines

A. Extent of uses and application

B. Design, construction and manufacture
   1. Names of major parts
   2. Piston arrangements
   3. Manufacturing processes

C. Fundamentals of gasoline engine operation
   1. Four-stroke cycle engine operation
   2. Two-stroke cycle engine operation
   3. Comparison of similarities and differences between operating principles

D. Major operating systems

1. Fuel System study

Laboratory Experiences	*Technical Knowledge*
Trace fuel flow through engine	Safety precautions
Remove, clean and replace fuel system components	Disassembly and assembly procedures
Trace fuel flow through carburetor	Proper use of hand tools
Dis-assemble carburetor, identify parts, and re-assemble	Proper use of measuring instruments and materials
Remove and service air-cleaner	Fuel refining processes
Adjust idle and high speed fuel mixtures	Names of, and functions of, fuel system components
Adjust choke for cold starting	Function of carburetor parts
	Principles of science applied by carburetors
	Types of carburetors
	Significance of air-fuel mixtures
	Types of air-cleaners
	Functions of air-cleaners

2. Lubrication system study

Laboratory Experiences	*Technical Knowledge*
Trace oil flow through pressure lubrication system	Kinds of lubricants
Trace oil path through splash lubrication system	Purposes of lubrication
Trace oil path through oil-mist lubrication system	Lubricant refining processes
Mix fuel and oil for oil-mist lubrication system	Purpose of multi-viscosity oils
Compare carbon formation in two-stroke and four-stroke cycle engines	Function of oil filters
Inspect lubricating oil-pumps and identify pump type	Cause of lubricating oil contamination
Compare various types of bearings and bearing surfaces	Types and operation of lubricating oil pumps
	Operation of oil pressure relief valves
	Principles of science applied by pressure lubricating systems and gauges
	Types and purposes of thrust and anti-friction bearings

3. Ignition system study

Laboratory Experiences	*Technical Knowledge*
Remove, clean, adjust and test spark plug	Types of spark plugs
Remove, test and replace capacitor	Function of spark plug in ignition timing
Test ignition coil windings for short or open circuit	Function of capacitor in magneto ignition system
Remove and replace breaker point assembly, and adjust gap	Understanding of short or open circuits
Adjust ignition timing	Electron theory of electrical current flow
Compare operation of generators and alternators	Function of breaker points in ignition timing
Test storage battery cells for voltage	Function of breaker point cam in ignition timing
Test storage battery electrolyte for specific gravity	Methods of creating electrical current flow
Compare flywheel magneto ignition system with battery alternator system	Meaning of voltage and amperage
	Meaning of specific gravity
	Significance of specific gravity and freezing point
	How the hydrometer measures specific gravity

4. Speed control system study

Laboratory Experiences	*Technical Knowledge*
Trace manual speed control linkage	Operation of simple machines — lever, pulley, wheel and axle inclined plane, screw and wedge
Adjust throttle linkage for low and high speed control	Function of throttle in speed control
Trace air-vane governor air path	Name and function of air-vane governor parts
Trace air-vane governor speed control linkage	Principles of science applied by air-vane governor
Remove, examine and replace centrifugal governor	Name and function of centrifugal governor parts
Trace centrifugal governor speed control linkage	Principles of science applied by centrifugal governor

5. Cooling system study

Laboratory Experiences	*Technical Knowledge*
Trace source of movement and path of air through air cooled engine	Principles of science applied by air cooling system
Trace source of movement and path of liquid through liquid cooled engine	Principles of science applied by liquid cooling system
Clean and flush liquid cooling system	Reasons for rust and scale information
Clean radiator core air passages	Methods of rust and scale prevention
Examine liquid cooling system for coolant leaks	Function and operation of water pumps
Remove, examine and replace thermostat	Function and operation of thermostats
Prepare and check anti-freeze solution	Kinds of anti-freeze solutions
	Freezing points of various liquids

E. Miscellaneous laboratory experiences with small power units
   1. Engine tune-up and/or reconditioning
   2. Engine repair and broken part replacement
   3. Rotary lawn mower blade sharpening and balancing
   4. Engine operating-period maintenance
   5. Preparation of power units for off-season storage
   6. Removal of power units from storage
   7. Automobile owner periodic inspection and maintenance
   8. Preparation of automobile for cold weather operation
   9. Preparation of automobile for warm weather operation
   10. Measurement and calculation of horsepower
   11. Measurement of two-stroke cycle engine crankcase pressures
   12. Trace flow of power through motor driven gear train and calculate speed of each gear to final drive

III. Miscellaneous activities related to power mechanics

A. Written and oral reports relating to power sources other than petroleum fuels

B. Construction of experimental or demonstration apparatus

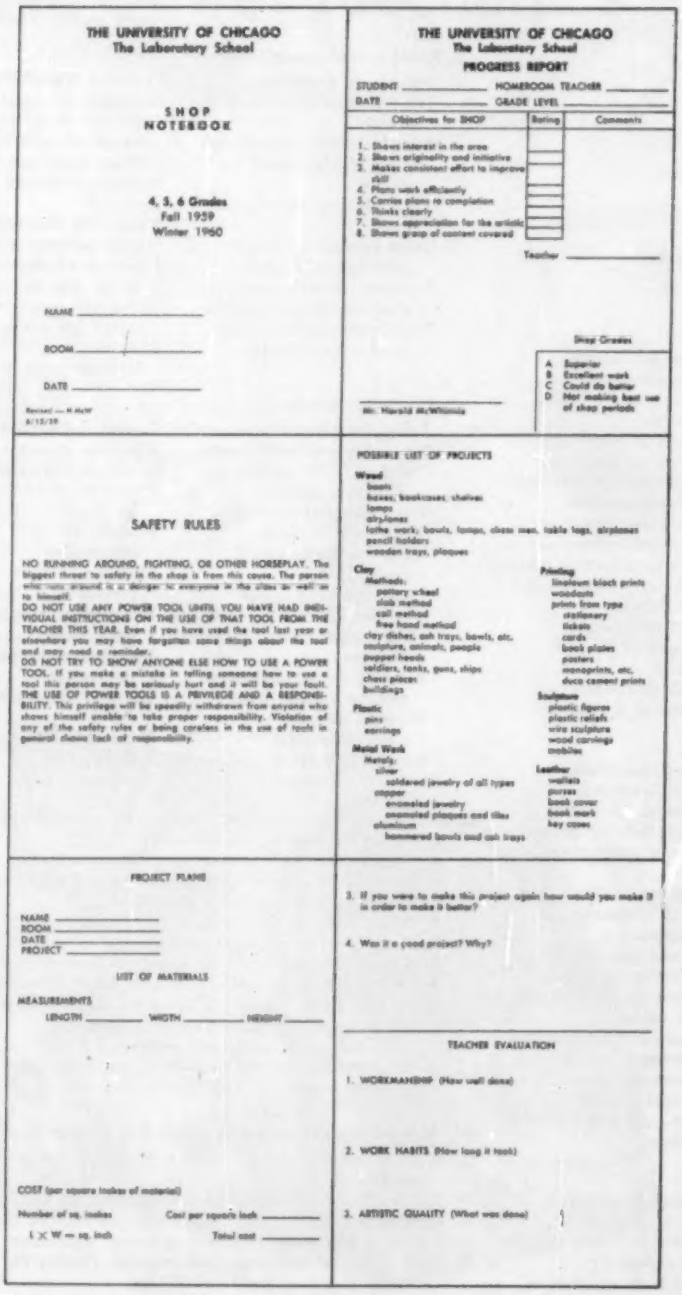
C. Experiments and demonstrations with commercial scientific apparatus illustrating principles of power application

D. Maintenance of newspaper and magazine clipping file relating to various phases of power mechanics.

▶ for improved student organization —

Try Shop Notebooks

HAROLD JAMES McWHINNIE



THE UNIVERSITY OF CHICAGO
The Laboratory School

SHOP
NOTEBOOK

4, 5, 6 Grades
Fall 1959
Winter 1960

NAME _____

ROOM _____

DATE _____

Revised — H McW
6/15/59

THE UNIVERSITY OF CHICAGO
The Laboratory School
PROGRESS REPORT

STUDENT _____ HOMEROOM TEACHER _____
DATE _____ GRADE LEVEL _____

Objectives for SHOP	Rating	Comments
1. Shows interest in the area		
2. Shows originality and initiative		
3. Makes consistent effort to improve skill		
4. Plans work efficiently		
5. Carries plans to completion		
6. Thinks clearly		
7. Shows appreciation for the artistic		
8. Shows grasp of content covered		

Teacher _____

Mr. Harold McWhinnie

Shop Grades

A Superior
B Excellent work
C Could do better
D Not making best use of shop periods

SAFETY RULES

NO RUNNING AROUND, FIGHTING, OR OTHER HORSEPLAY. The biggest threat to safety in the shop is from this cause. The person who runs around is a danger to everyone in the class as well as to himself.
DO NOT USE ANY POWER TOOL UNTIL YOU HAVE HAD INDIVIDUAL INSTRUCTIONS ON THE USE OF THAT TOOL FROM THE TEACHER THIS YEAR. Even if you have used the tool last year or elsewhere you may have forgotten some things about the tool and may need a reminder.
DO NOT TRY TO SHOW ANYONE ELSE HOW TO USE A POWER TOOL. If you make a mistake in telling someone how to use a tool this person may be seriously hurt and it will be your fault. THE USE OF POWER TOOLS IS A PRIVILEGE AND A RESPONSIBILITY. This privilege will be speedily withdrawn from anyone who shows himself unable to take proper responsibility. Violation of any of the safety rules or being careless in the use of tools in general shows lack of responsibility.

POSSIBLE LIST OF PROJECTS

Wood
- boats
- boxes, bookcases, shelves
- lamps
- airplanes
- lathe work, bowls, lamps, chess men, table legs, airplanes
- pencil holders
- wooden trays, plaques

Clay
Methods:
- pottery wheel
- slab method
- coil method
- free hand method

clay dishes, ash trays, bowls, etc.
sculpture, animals, people
puppet heads
soldiers, tanks, guns, ships
chess pieces
buildings

Plastic
- pins
- earrings

Metal Work
Metals:
- silver
  - soldered jewelry of all types
- copper
  - enameled jewelry
  - enameled plaques and tiles
- aluminum
  - hammered bowls and ash trays

Printing
- linoleum block prints
- woodcuts
- prints from type
  - stationery
  - tickets
  - cards
  - book plates
  - posters
  - monoprints, etc.
- duco cement prints

Sculpture
- plastic figures
- plastic reliefs
- wire sculpture
- wood carvings
- mobiles

Leather
- wallets
- purses
- book cover
- book mark
- key cases

PROJECT PLANS

NAME _____
ROOM _____
DATE _____
PROJECT _____

LIST OF MATERIALS

MEASUREMENTS
LENGTH _____ WIDTH _____ HEIGHT _____

COST (per square inches of material)
Number of sq. inches _____ Cost per square inch _____
L × W = sq. inch Total cost _____

3. If you were to make this project again how would you make it in order to make it better?

4. Was it a good project? Why?

TEACHER EVALUATION

1. WORKMANSHIP (How well done)

2. WORK HABITS (How long it took)

3. ARTISTIC QUALITY (What was done)

sample pages of a typical notebook.

There is a need for some method of keeping student records and project plans. These records include: project plans, drawings, lists of materials, cost of projects, shop library reports, and various instructional sheets. These notebooks are handed in several times during the school year for a grade and for other progress report data. After several years of experience with these books the writer discovered that this shop notebook represents a most effective teaching and self-teaching tool.

Before development of notebooks, the students were filling out loose single sheet project plans and project reports and these were continually lost amid a sea of papers. The notebook is very simple and efficient. The various blank mimeographed forms are prepared by the school office and the students make colored paper covers out of construction paper. These notebooks are assembled on the first day of shop class.

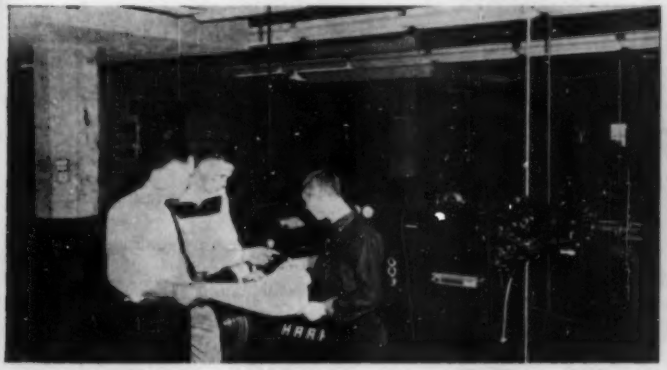
The standard notebook consists of the following materials: shop safety rules, list of required work and projects, shop book report forms, shop magazine report forms, project plan sheets, project report sheets, and progress reports and report-to-parents forms.

These various forms are used in many ways. For example, before starting a project the students fill out their project plans which include the following information: a drawing of project, a list of the materials needed, measurements, estimated cost, and the steps in making the project. This form is filled out and handed in for approval before the project is begun.

The report forms are filled in before the project is taken home after it is finished and includes the following information: materials used, hand tools used, power tools used, the child's suggestions for improvement, and the child's evaluation of the project. It also includes the teacher's evaluation for the project. The book report forms and the magazine reports are used when those two assignments are due. The required list of projects clearly outlines to the child what is expected of him and how much he is required to do. ◀

Mr. McWhinnie, who was industrial arts instructor at the summer session of the Laboratory School at the University of Chicago, teaches at the Boys Secondary School, St. George's, Grenada, West Indies.

Views of the press (below) and linotype (right) areas of the printing department's modern shop of the Des Moines (Iowa) Technical High School.



Let Industry Shape Your Printing Curriculum

ROBERT R. DENNY

- **Most effective way to construct a curriculum in any vocational area? Examine local industry!**
- **In Des Moines, officials built a sound printing program by examining the area's industry to develop marketable skills for its graduates. Read the following for the "why and how."**

The vocational education curriculum of a school should reflect the needs of the area it serves. At Des Moines Technical High School the curriculum of the vocational printing department reflects the needs of the local printing and publishing industry.

Dr. Denny is administrative assistant to the superintendent of the Des Moines, Iowa, schools.

Des Moines ranks high as a publishing center with the home offices of such periodicals as "Better Homes and Gardens," "Successful Farming," "Des Moines Register and Tribune," etc.

In addition, many large insurance companies with home offices in Des Moines maintain print shops. The graduates of the vocational printing course, therefore, have many job opportunities. To see that they have marketable skills is the responsibility of school officials as they build a sound curriculum.

Printing in the Des Moines Schools

At one time instruction in printing was offered in grades 7 and 8. In 1922 the print shop was enlarged and the curriculum elevated to the senior high school level; at this time it was moved to East High School. In 1942 a separate technical high school was begun and again the printing department was moved to new quarters.

In 1958 a new technical high school was opened. The floor space was expanded about four times. The new building with its larger area offered an opportunity to plan and lay out the various centers — composition, layout, lockup, platen press space, cylinder press area, offset photography, offset press space, bindery layout, paper storage, office setup, etc. Also more equipment was added, mainly in the area of offset printing.

The equipment in the vocational printing department at Des Moines Technical High School consists of: 1 Linotype; 1 Monotype — keyboard and caster; 2 Linotype learning keyboards; 1 22-in. Harris Offset press; 1 29-in. Big Chief; 1 22-in. Little Chief; 2 Multilith presses; 1 28-in. Miller automatic cylinder; 1 12 by 18 Chandler & Price cylinder; 1 platen Craftsman automatic; 6 Open platen presses; 2 23-in. and 32-in. Arc burners; 1 36½-in. Paper cutter; 1 Wire stitcher; 1 Folder; 1 Paper drill; 1 25-in. Perforator; 1 22 by 28 Baum folder; 12 Double tier work banks with cases; 12 Galley racks and cabinets; 1 Saw trimmer with carbide blade; 1 Proof press; 2 Imposing stones; and 2 Furniture cabinets and steel furniture.

Vocational Printing Curriculum

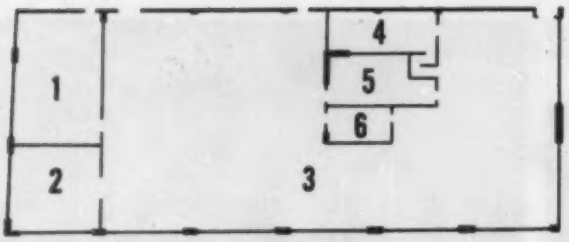
During the first semester at Des Moines Tech, the students take a general course known as trades and industries. They preview the major vocational areas by spending several weeks in each shop. For the second semester of tenth grade and in grades 11–12 they concentrate in one area.

Listed below in outline form are the major learnings of the students taking vocational printing at Des Moines Tech.

Printing I — 10th Grade

Introduction to the printing core area, 2 hours;

Layout of the California job case



1. classroom
2. typecasting
3. press area
4. dark room
5. storage
6. office

The department's classroom (above) and composing room (below).

and the news case, 7 hours;
Nomenclature and care of tools and materials used in hand composition, 4 hours;
The point system and its application, 5 hours;
Straight matter composition, 150 hours;
Proofing and proofreading, 15 hours;
Composition and multiple justification, 12 hours;
Using borders and ornaments, 24 hours;
Setting a two-color job, 12 hours;
Variations in type faces and what printers should know about them, 15 hours;
Ad composition, 30 hours; and
Imposition and lockup, 9 hours.

Printing 2 — 11th Grade

Practice-feed platen press, 12 hours;
Feed jobs on platen press, 70 hours;
Linotype keyboard practice, 15 hours;
Linotype operation, 15 hours;
Operate cutting machine, 10 hours;
Operating of folding machine, 18 hours;
Stripping in offset work — assistant to pressman, 10 hours;
Offset plates for multilith and Chief 22, 10 hours;
Offset presses (oil and cleaning), 10 hours;
Practice setup of offset presses, Multilith, Harris LTV, Chief 22 and Chief 29, 23 hours;
Running of offset presses, 35 hours;
Operation of paper drill, operation of stitcher, set and feed the perforator, 15 hours; and
Jogging, padding, tabbing, wrapping, 32 hours.

Printing 3 — 11th Grade

Reading a job ticket, 1 hour;
Linotype composition, 15 hours;
Preparation and application of layouts, 15 hours;
Ad and Job composition, 25 hours;
Lockup for platen press, 10 hours;
Cylinder lockup, 9 hours;
Operation of paper cutting machine, 30 hours;
(At this point the student will have spent 35 hours in Related Printing 3, approximately 15 hours of this class time will be spent in complete cost finding of printed jobs.)
Complete operation of platen presses, 25 hours;
Assistant pressman on automatic presses, platen and cylinder, 35 hours;
General bindery work, 30 hours;
Complete operation of the multilith and Chief 22-in. offset presses, 24 hours;
Assistant pressman on large offset presses, Harris LTV and Chief 29, 24 hours; and
Stripping small offset jobs, 20 hours.

Printing 4 — 12th Grade

Complete operation of automatic platen press, 40 hours;
Automatic cylinder press operation (small and large cylinder), 10 hours;
Makeready on small and large cylinder presses, 40 hours;
Linotype operation, machine changes and maintenance, 15 hours;
Makeup newspaper pages, set heads, layout, impose, lockup for cylinder and read proof, 30 hours;
Set up perforator, punch and stitcher, 10 hours;
Complete operation of the Chief 29 and the Harris offset presses, 30 hours;
Small offset press operation, 30 hours;
Large offset press operation, 30 hours;
Stripping combination job (half tone and line negative), 30 hours; and
Platemaking.

Printing 5 — 12th Grade

(If their grades permit, students may go on co-operative training for printing 4 and 5. The students are placed in approved shops and paid $1 to $1.50 an hour. This co-operative training program has been in operation 20 years. In the present semester 22 students are working on a co-op basis.)
Putting jobs on platens (open and automatic), 40 hours;
Paper cutter operation, 20 hours;
Linotype operation, 20 hours;
Putting jobs on cylinder presses, complete operation, 40 hours;
School paper — ads, make-up, composition and pulling reproduction proofs, 30 hours;
Offset production work on all presses, 100 hours;
Cutting stock, 32 hours; and
Interpretation and entries to be made on a job ticket, 3 hours.

The accompanying course outline was prepared by Messrs. Lyle Smithson, Dale Harsh, and Nathan Lee, the three printing instructors at Des Moines Tech High.

Mr. Smithson pointed out that students completing this course have had experience and instruction in practically every phase of commercial printing. Their experience begins with simple hand composition and progresses to the printing of the school newspaper and forms for the school district.

Mr. Smithson emphasized that, "This course is not intended to take the place of the prescribed apprentice training programs as sponsored by the Allied Printing Trades but to give young people an understanding that will enable them to more satisfactorily complete an apprenticeship program. The effectiveness of this course of study should be judged by the ready acceptance of the graduating students by the Allied Printing Trades in the Des Moines area." ◀

▶ Results of a study of the relationship between teacher and counselor for successful —

Vocational Placement: A Co-operative Function

J. HENRY ZANZALARI

One of the primary purposes of vocational education is the satisfactory adjustment of the student to the trade for which he was trained. Placement is the process through which this objective is achieved. Prosser and Allen considered the failure to attain this objective as ". . . a distinct loss of human resources,"[1]

The placement service in the vocational and technical high school is the means whereby assistance is given to students to locate work in the field for which they were trained. The nature of the responsibility for the placement service is presently similar in most vocational and technical programs of New Jersey. This assignment normally rests with a member of the school staff designated as a guidance and placement counselor.

However, as recently as 1943, the organizational patterns of the majority of the vocational programs in New Jersey lacked such a person called the placement counselor. Jochen,[2] in his history of vocational education in New Jersey, reported that of the ten vocational programs existing only one delegated the responsibility for placement to a placement counselor. In the remaining systems, placements were made by the principal, the apprentice co-ordinator, or the shop teacher.

As predicted by Jochen, the George-Barden Act of 1946 greatly affected the nature of the placement function through the allotment of funds for guidance services. Vocational programs in New Jersey responded quickly and favorably to the Act, resulting in an increasing number of guidance and placement counselors. Presently, of the 19 vocational and technical programs in the state, 17 indicated that the responsibility of placement is assigned to a placement counselor.

Though the nature of the responsibility for making placements has changed in emphasis from the principal, shop teacher, and apprentice co-ordinator to the guidance and placement counselor, some aspects of the former process remain.

Teachers and Counselors

A study of 136 shop teachers in New Jersey vocational and technical high schools,[3] revealed that the typical shop teacher is one who co-operates with the guidance and placement counselor in making placements. Such placements emphasize graduates rather than in-school pupils, dropouts, or evening school students. This co-operation manifests itself in several ways. Occasionally shop teachers recommend students to the placement counselor when there are apprenticeships to be filled. Other times, the instructors place graduates on the job directly with the aid of the placement services. Although frequently shop teachers directly place graduates on the job, they do so without being assigned such responsibilities.

Eighty-five per cent of the shop teachers interviewed felt that their recommendations of students for job openings were put to good use by the placement counselors. This pointed up a mutually high evaluation of the co-operation between shop teachers and placement counselors.

Over ninety-five per cent of the shop teachers used placement records to instruct their students in the improvements of work habits and attitudes. The typical situation involved either a group discussion of reasons for placing one graduate rather than another on a job, or an analysis of reasons for job successes and job failures.

The importance of shop teachers as a source of job opportunities in the placement function is readily seen in their union and industrial contacts. Many of these instructors hold responsible positions in union activities. The degree of activity is illustrated in such typical comments excerpted from interviews with shop personnel:

"I am program director for the state baking association. I meet over 150 bakers every month. These people are my best contact for making placements."

"I am secretary of the local printing union. I attend all union meetings where I contact potential employers."

Co-operation Is Needed

This co-operative relationship between shop teachers and placement counselors also serves as a means of evaluating the placement services. The proximity of the instructor to employers and graduates is useful in gathering data to determine the value of placement activities.

Thus, though the nature of placement has changed, particularly in regard to the responsibility for its functioning, the process has been strengthened through a co-operative effort on the part of shop teachers and placement counselors. The evidence of success from such co-operation is apparent in terms of one of the purposes of the placement service-excellent placement records. ◀

[1]Prosser, Charles A., and Allen, Charles R., *Vocational Education in a Democracy* (New York: The Century Company, 1925), p. 5.

[2]Jochen, Albert E., "The History and Development of State and Federally Aided Day Trade and Industrial Schools in New Jersey from their Inception to 1943." Unpublished Doctoral Dissertation, Rutgers University, New Brunswick, N. J., 1947, 369 pp.

[3]Zanzalari, J. Henry, "The Placement Service in New Jersey Vocational and Technical High Schools." Unpublished Doctoral Dissertation, Rutgers University, New Brunswick, N. J., 1960, 219 pp.

Dr. Zanzalari teaches at Middlesex County Vocational and Technical High School, New Brunswick, N. J.

special report

— Biltmore Hotel

Previewing the AVA In Los Angeles

The dates: December 3–9; the place: the Biltmore Hotel, Los Angeles, Calif.; the event: the 1960 convention of the American Vocational Association.

Under the general chairmanship of J. Lyman Goldsmith, supervisor of vocational and practical arts for the Los Angeles city schools and cochairman Lee W. Ralston, director of the practical arts and education for Los Angeles county schools, a week of exciting meetings has been planned. Keynoters will include Howard Pyle, president, National Safety Council, Chicago; Jim Thomas, president, Future Farmers of America; Mark Nichols, state director of vocational education, Salt Lake City. Mr. Nichols in his speech, "Russia's Vocational Education Program and Its Relation to the Economic Challenge to America," will report his observations of a recent trip to the USSR to study Russia's Voc-Ed development and what this expanding program means to American civilization.

Special meetings during the week will include those for the American Technical Education Association, National Council of Local Administrators of Vocational Education and Practical Arts; National Association, Industrial Teacher Educators; National Association, State Supervisors of Trade and Industrial Education; and State Directors of Vocational Education.

In addition, divisional meetings will be held in Agricultural Education, Business Education, Distributive Education, Home Economics, Industrial Arts, Trade and Industrial Education, and Vocational Guidance. The programs for the Industrial Arts, T & I, and ATEA groups are outlined on the following pages.

Appealing side lights of the convention this year in Los Angeles will include an evening of entertainment with dinner and a floor show at the renowned Moulin Rouge on Wednesday evening, Friday night's ship's program with entertainment and prizes, and the usually compelling showcase of equipment and supplies displayed by the exhibitors.

Expansive and exciting, the 1960 convention of the AVA promises again to be industrial education's "greatest show on earth" and professionally well worth the time and interest of everyone concerned about the problems of progress of one of our most vital fields of education in the space age.

Trade and Industrial Divison

The 1960 convention program is centered on three major subjects of interest to vocational industrial educators: (1) training for technical occupations; (2) industry-school relations; (3) in-service or extension training for employed industrial workers. Discussions or programs for each of these interest areas will include program planning, curriculum building, student selection, technological changes and demands, sociological implications, methodology, standards of achievement, trends, and other specific topics of importance to the professional educator.

The favorable location of this year's convention makes it possible to involve a larger number of industrial groups or associations that have a real interest in the further development of vocational industrial education. Some of these are: Electronic Industries Association; American Society for Metals, American Welding Society, American Society of Training Directors, Technical Illustration Management Association, National Council on Hotel and Restaurant Education, International Graphic Arts Education Association, Automobile Manufacturers Association, and the Sears-Roebuck Foundation.

Program speakers include: Dr. John P. Walsh, Director, trade and Industrial Education Branch, U. S. Office of Education; Dr. Walter Arnold, Director, Area Vocational Schools, U. S. Office of Education; Henry E. Thurston, Assistant Director, Office of Industrial Relations, U. S. Atomic Energy Commission; Thomas L. Pitts, Executive Secretary-Treasurer, California Labor Federation AFL-CIO; Lawrence Larsen, Training Director, AiResearch Manufacturing Company, Los Angeles; Dr. Samuel L. Brownell, Superintendent of Schools, Detroit, Michigan; Frank B. Lindsay, Chief of Bureau of Secondary Education, California State Department of Education; Miss Kathryn Bruce, Educational Director, National Restaurant Association, Chicago; Mrs. Mary Resh, Program Specialist, Trade and Industrial Education Branch, U. S. Office of Education; Samuel M. Burt, Managing Director, Education Council of the Graphic Arts Industry and Dr. R. E. Lusk, Director of Education, Automobile Manufacturers Association.

The principal speaker for the general session of the trade and industrial Division on Friday morning, December 9, is Dr. John K. Coster, Associate Professor, Purdue University. His subject is "Vocational Education in Public Schools as Related to Social, Economic and Technical Trends"—a report on

the co-operative research project of Purdue University and the U. S. Office of Education.

A second feature of this meeting will be the premier showing of a motion picture film which tells the story of trade and industrial education. It is being produced by the Sears-Roebuck Foundation in co-operation with the trade and industrial division of AVA.

In addition to the trade and industrial division program, each of the affiliated associations have planned related programs of interest for trade and industrial teacher educators, state supervisors, and local directors.

The variety and scope of this year's program is such that all persons concerned with trade and industrial education or the employment of the graduates of vocational industrial classes will find a full week of profitable professional meetings to attend according to their interests and needs. All levels and all areas of vocational industrial training were considered by the trade and industrial division policy and planning committee in the formulation of this program. A total of 17 sectional meetings have been scheduled within the limited time available. These range from training in automotive occupations to welding and include special meetings related to all occupations falling into the general classification of industrial pursuits that are of interest to women. ◀

F. J. Konecny
AVA Vice President for Trade and Industrial Education.
Engineering Extension Service
College Station, Tex.

American Technical Education Association

Sunday, December 4 — 3:00 p.m.
Meeting of ATEA Officers and Governing Board.
Chairman: J. William Morosi
Sunday, December 4 — 7:30–9:30 p.m.
Chairman: W. N. Fenringer, Exec., Sec., ATEA
Speaker: Dr. Walter Arnold, Director, Area Vocational Schools, U. S. Office of Education.
Topic: Progress Report on Title VIII Programs — Plans for Future.
Monday, December 5 — 9:00–11:00 a.m.
Joint Meeting: ATEA and NASSTIE.
Chairman: Dr. Byrl D. Shoemaker, President, NASSTIE — Sup. T. & I. State Dept. of Voc. Educ., Columbus, Ohio.
Speaker: Paul B. Zbar, Director Electronics Training, New York Trade School.
Topic: Training of Electronics Technicians in Communications, Instrumentation, Industrial Control and Research Development.
Speaker: William Rodgers, Head, Dept. of Mechanical Technology, New York State University Agricultural and Technical Institute.
Topic: Technician Training for Metalworking and Plastics Industries.
Panel Moderator: Dr. Melvin L. Barlow, Director, Div. of Voc. Educ., University of California.
Panel:
James C. Carr, V.P., Industrial Relations, Waste King Corp.
Elmer Sproule, Director, Personnel Relations, Hughes Aircraft Corp.
John Henderson, Personnel Manager, Alba Engineering Co.
R. Bradley, Chairman of the Advisory Vocational Committee, Board of Education for North York, Willowdale, Ontario.
Topic: Industry — School Relations.
Monday, December 5 — 11:15 a.m.
Business Meeting of the ATEA.
Chairman: J. William Morosi, Vice-President, ATEA, Dean of Extended Day Division, Los Angeles Trade Technical College
Monday, December 5 — 12:15 p.m.
ATEA Luncheon Meeting.
Chairman: J. William Morosi
Speaker: Dr. Burr D. Coe, Director, Middlesex County Vocational and Technical High School, New Brunswick, N. J.
Topic: Sociological Implications for Technician Training.
Monday, December 5 — 2:00–4:00 p.m.
Joint Meeting of ATEA, NASSTIE, NCLA, NAITE, T & I Women's Division.
Chairman: Mack Stoker, Regional Supervisor, California State Bureau of Industrial Education
Theme: Concepts and Requirements for Trade and Technical Education Programs in the 1960's.
Speaker: Joe Bellanger, Local Director, San Jose Schools.
Topic: Curriculum Planning on High School, Junior College and Technical Institute Levels.
Speaker: F. Parker Wilber, President, Los Angeles Trade Technical College.
Topic: Standards for Recruitment and Selection of Students in Trade and Technical Programs.
Speaker: Dr. Margaret M. Crawford, Counselor and Testing Research, L.A.T.T.C.
Topic: Occupational Training for Women in Technological Pursuits.
Speaker: Richard Nelson, Special Supervisor, Technical Education California State Dept. of Education.
Topic: Trade and Technical Education and Changing Industrial Requirements. ◀

Industrial Arts Division

The 1960 convention program opens on Monday morning with a schedule of five meetings held jointly with State and Local Industrial Arts Supervisors. The topics for these conferences are "The Tools of Leadership," "Publication Writing," "Telling the Industrial Arts Story," "Objective Observation of Teaching," "Reading in Industrial Arts Education." The speakers for these topics, respectively, will be Dr. Clifford Dobson, head, Industrial Arts Department, Los Angeles State College, Los Angeles Calif.; Robert L. Woodward, consultant, industrial arts education, State Department of Education, Sacramento, Calif.; William B. Steinberg, supervisor, industrial arts education, San Diego City Unified School District; Milo Johnson, superintendent, Imperial Junior College District, El Centro, Calif.; Gordon Funk, supervisor, industrial education, Los Angeles, Calif., City Schools.

On Tuesday afternoon, a session will be conducted on "Technical Illustration in the Drafting Program" with six presentations by 12 representatives of the Technical Illustration Management Association and local industries on (1) operational handbook illustration, (2) flight handbook illustrations, (3) electrical schematics, (4) drawing techniques, (5) tools and materials, and (6) promotional and commercial art. The program is under the chairmanship of Wesley Craig, counselor, Los Angeles Trade-Technical College, Los Angeles, Calif.

The important topic, "A Balanced Program of Industrial Education in the High Schools of the United States," will be analyzed on Wednesday morning by Samuel M. Brownell, Detroit, Mich., superintendent of schools; Frank B. Lindsay, chief, bureau of secondary education, California State Department of Education, Sacramento, and Thaine McCormick, head, teacher education, Kansas State Teacher College, Pittsburg, Kans. Four industrial educators (Joseph Schad, Robert Worthington, Green Trimble, and William J. Hucksoll) will discuss the statements of the above.

A Wednesday afternoon business meeting will be concluded with six panel discussion groups discussing school shop planning, implementation of math-

(Concluded on page 50)

projects

The use of copper tubing in art metalwork involves the student's awareness of design and skill in a variety of processes, such as enameling, oxidizing, buffing.

UTILIZING COPPER TUBING

JOHN A. CAREY
St. Mark's School
Southboro, Mass.

The planning and designing of the canisters represented a problem in taking a common commercial product and utilizing it in an artful manner. So often we see pistons, shells, chain, tires, etc., ingenuously used to perform some function, but in poor taste.

The products pictured here may not be prize-winning examples of design, but they are stepping stones in a student's training toward critical thinking in this area. This project was conceived so that the student might explore and reflect on what might be done to make an ordinary object unique rather than merely copying work of someone else.

Many types of lids and bases can be made that would look attractive; the points to consider are the over-all proportions, the treatment of the copper cylinders — enameled, etched, appliqued, stamped, oxidized, buffed, chased, brushed, or painted — the selection of proper materials, where the item is to be used, and again, its usefulness.

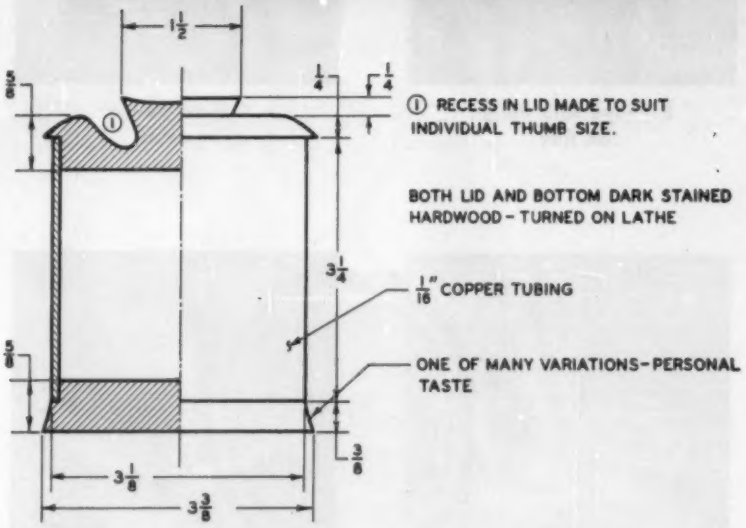
The gratifying aspect of this project is that the tools and materials necessary to construct the canisters are always available in a general shop. Large copper pipes are obtainable from scrap yards, the maintenance departments of most institutions, and local plumbers.

The lids and bases are real challenges to any individual's imagination. Some possibilities include: spun copper lids and bases, wooden parts turned on the lathe, metal parts turned on the metal lathe, plain or enameled disks, ceramic lids and bases, mosaics on wood or metal, and plastic lids and bases.

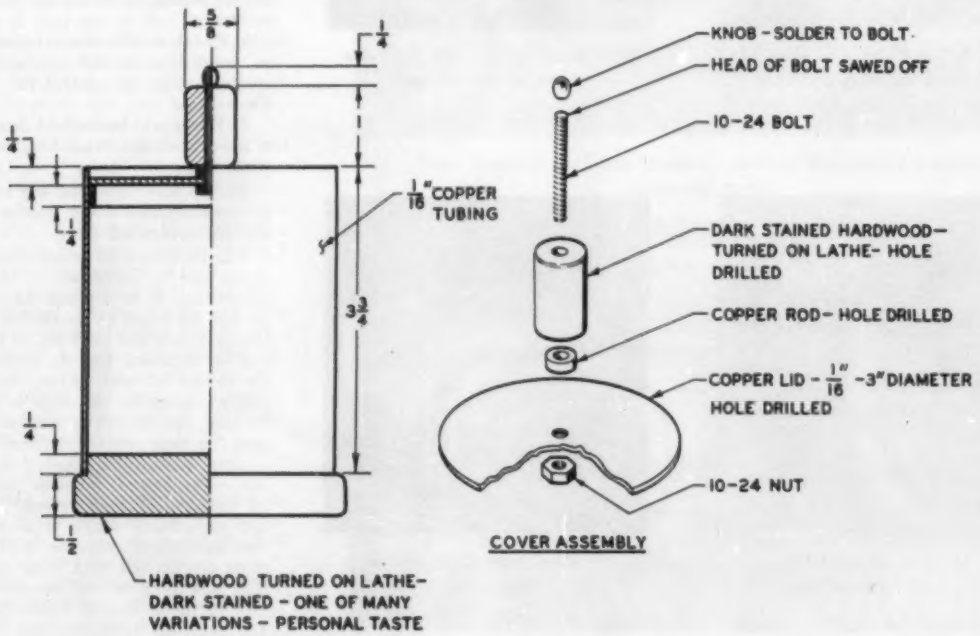
If a knob for one of these lids is needed, even more possibilities open up, for it will give those people who like to carve plastic or cut stones a chance to do something different with their particular abilities. Even the novice can turn acceptable wooden knobs on the lathe, and again a simple piece of rod might be just the right thing.

It is interesting to note that the copper tubing can be used in a very modern way, such as the low vase with the three different sizes of pipe soldered on its top, or the piece where the student is binding an applied wire design on a single piece of stock.

Finished examples of a variety of projects in copper tubing.



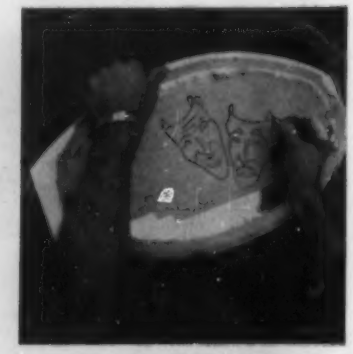
Drawings for canister (right) and cigarette box (below), projects using copper tubing.



FUN IN ETCHING

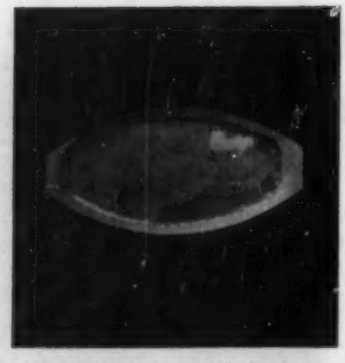
GERALD M. MUGERIAN
Industrial Arts Department
Los Angeles State College

Put tape with design on tray.



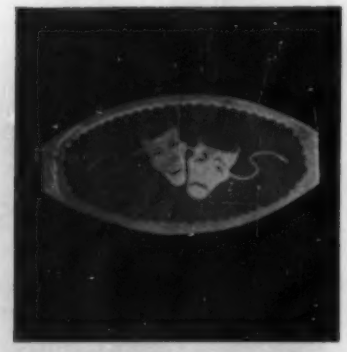
Cut out design on tape.

Tape edges of tray to prevent acid from marring surfaces.



With blunt edge work the tape tight to the metal.

Set tray on acid for 20 minutes.



Finished product ready for house use.

In most art metal or handicraft shops, etching is one of the more popular techniques being taught. The beauty of many objects in metal may be enhanced by the process of etching; since beauty is a desired quality of good design, the simplest techniques towards acquiring this necessary attribute are welcomed by teachers and students alike.

Here is a simple and easy method to etch by using a pressure sensitive tape to form the desired design. The materials that are needed are: a roll of pressure sensitive tape, a blunt tool to be used to press the overlapped tape securely to the metal, and a sharp cutting tool, such as a razor blade or a cutting knife.

In schools, most etching is done on either copper, aluminum, or brass. The following is the procedure for etching an aluminum tray:

1. The tray must have the desired polish and finish on it before etching.
2. Apply the tape to the metal covering the area where the design is desired. Be sure to overlap the edges of the tape at least ⅛ in.
3. Trace or draw the design on the tape.
4. Cut out the areas to be etched using a razor blade or knife.
5. Run the blunt edging tool over all the overlaps of the tape to be sure that the tape is securely stuck to the metal.
6. Apply tape around the outside edge of the tray and cut in the desired border design.
7. Place tray on a level surface and fill with acid to cover all areas to be etched.
8. Check results every 15 minutes or so depending on the strength of the acid, in order to control the depth of the etching.
9. When acid has etched deep enough, remove acid, and wash tray thoroughly with water.
10. Remove tape, and the results will be a well-etched design having fine and sharply controlled lines.

The technique of using pressure sensitive tape is fairly new in the process of etching. It is superior to asphaltum in that the edges of the design are much sharper, very fine lines within the design can be obtained, and the application of the design is much easier. Another advantage in using the tape is that after etching, the project is washed in water, and the tape simply removed to show a clean, beautifully polished design. The use of asphaltum involves the washing of the project in a solvent to remove the asphaltum, which is a messy and time-consuming process, and then it must be washed with soap and water. The difference in the simplicity of the two methods is well worth the use of the pressure sensitive tape.

▶ On the college level —

THE CLEAN-UP CHART AS A MASS PRODUCED PROJECT

EVERETT V. TRAYLOR
Assistant Professor of Industrial Arts
Nebraska State Teachers College, Peru

In industrial arts teacher training, visual aids are often made in certain classes. These visual aids are to be used when the future teacher begins his actual teaching experience the next year.

This clean-up chart is one of the projects done in our mass production class.

Several objectives have been achieved in its completion. Spreading the use of some sort of clean-up organization to many schools not presently using one is a prime objective. If we have 20 students in a class, we can perhaps rely on at least 14 or 15 of the charts to be used within the following two years.

The project is truly a multi-operation product, fulfilling necessary requirements of mass production.

The chart was modified and improved by the students from a similar chart used in the shop. Therefore, the students are familiar with its operation.

Even if students in the class do not plan to teach industrial arts, the chart is easily adaptable for use in music, art, physical education, and other situations where materials are distributed and/or assignment of duties is required.

The chart will be already prepared for use, thus going one step further than the mere recommending to graduating students that they make one when they arrive at their new shop situation — they will be busy enough without another teaching aid to prepare.

The chart is one approach to an effective personnel system. Other methods have been devised. Criteria for development should include: (1) rotating responsibility, (2) ease of changing, (3) readily readable, (4) fair to all students, and (5) reduce the amount of supervision by the teacher.

Construction Details

Materials used may vary according to what is available. The size should be large enough to use cards of about 2 by 3 in. for easy readability.

Double aluminum channel would make an attractive substitute for the rabbeted wood strips used here.

Name cards can be made from heavy tagboard and then sprayed with clear lacquer after lettering the names.

Front View

The top slot holds job designations. It is desirable that the jobs not be printed in permanently because shop needs will vary from year to year.

Various classes are noted in the left column.

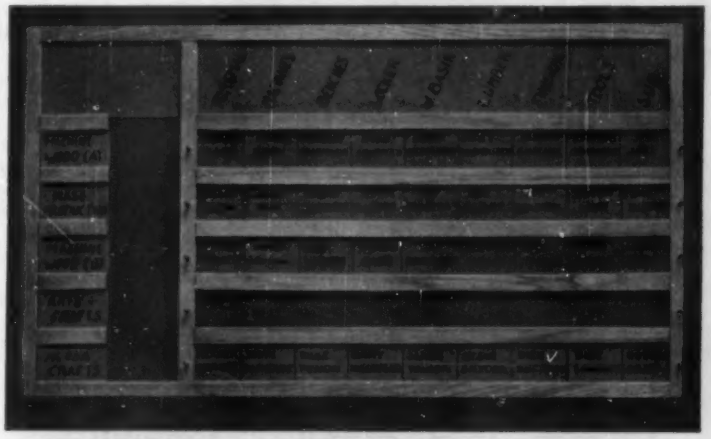
Cotter keys or pegs are used at the ends of name rows and are optional. Unless the board is located in a windy or busy area, these stops would not be necessary.

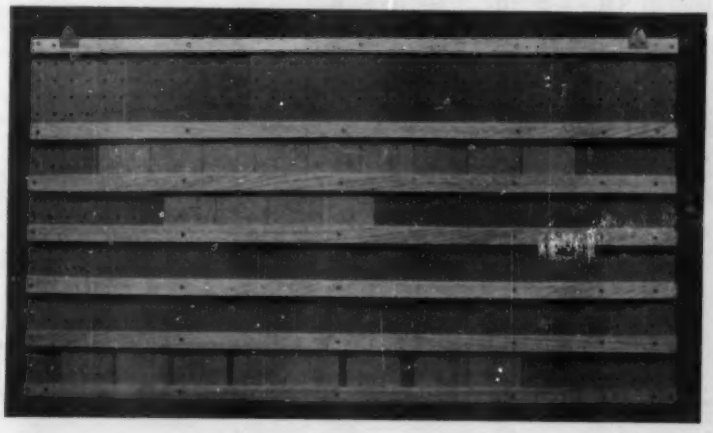
Name cards are slid in at the right end of the panel. This pushes the card on the left out into the open space. The retiring card is then slipped into the corresponding channel at the back.

Back View

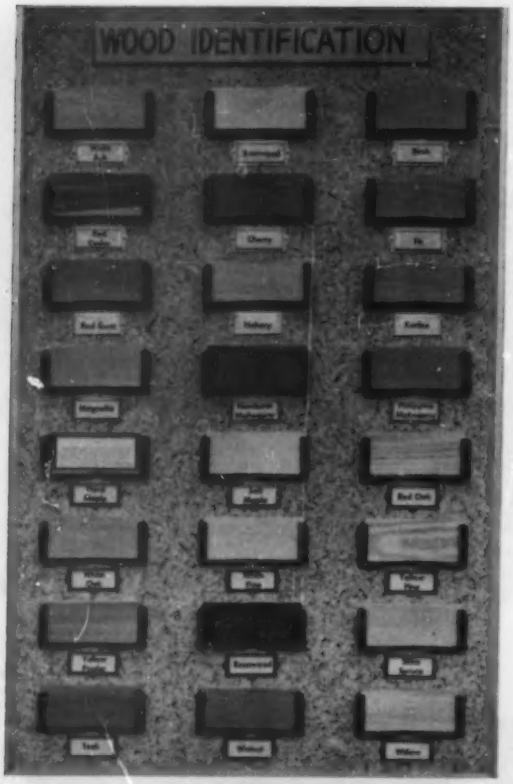
It is obvious from this view that the extra cards are kept in proper order without resorting to a separate holder. Space is provided for more name cards than would be needed in a normal size class.

Well-made cards can be saved from year to year for use in succeeding classes, with additional cards added as necessary. ◀



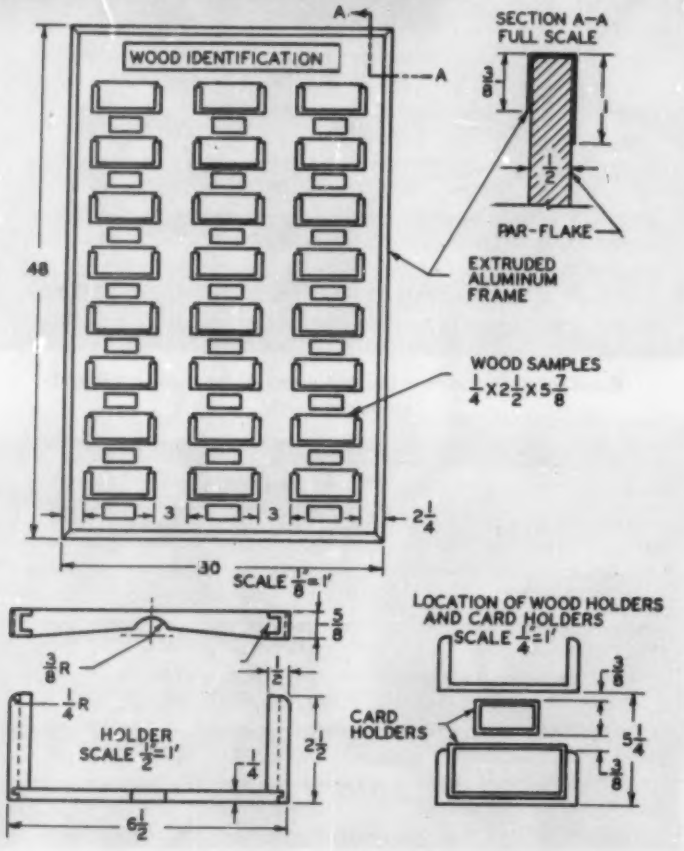


Front (above) and rear (below) views of the mass-produced clean-up chart.



A TEACHING AID FOR WOOD IDENTIFICATION

RICHARD MURPHY
Graduate Assistant, Industrial Education Department
Western Michigan University, Kalamazoo



This teaching aid is useful in such classes as wood finishing, beginning woods, machine woods, and arts and crafts. Its 30 by 48-in. size was determined as best for ease of reading from the most distant seat from the teaching center in an average classroom, for economy of materials used, for ease of handling, etc.

The frame, made for the sake of appearance and to keep the edges of the mounting board from being damaged, was anodized (coated with protective film), extruded aluminum. It was mitered at the corners and fastened to the mounting board from the back with ½ in., No. 6 f.h.b. wood screws. The aluminum was cut on a circular saw, using a carbide blade. One half inch par-flake was used for the mounting board to break up what might be a monotony of solid woods.

The construction of the holder, devised after considerable figuring and building, is relatively simple but does demand careful planning and accurate work. Note on the accompanying illus-

trative material how the radius is cut in the center of the holder to permit insertion of the finger when removing a sample. A ¾ in. diameter hole was drilled in the horizontal piece before the frame was glued up. Then a jig was designed to hold the piece of wood while the two angles were cut on the front of the horizontal piece on a radial saw. To speed up the building of these holders, jigs and stops were used extensively.

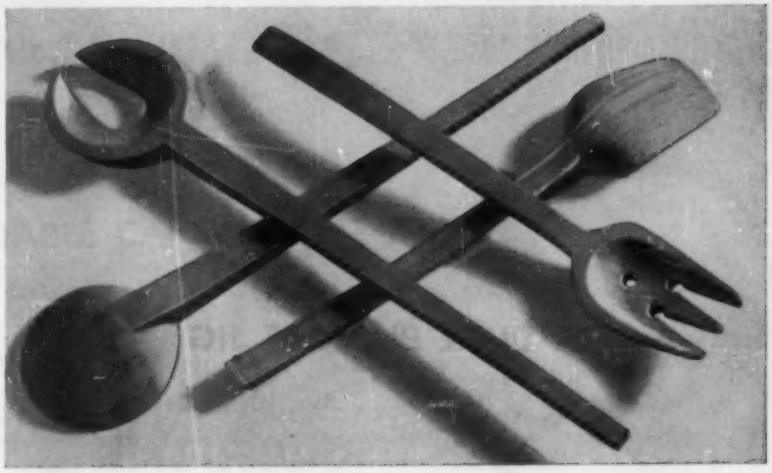
The wood samples were placed in alphabetical order and were identified by a printed card held by a brass card holder. After trial and error with several different sizes of type, 36 pt. Spartan printed on five-ply mill blank cardboard proved suitable and could be easily read from the most distant seat from the teacher center.

The name of the wood with the most letters was used to determine the size of the card holder to be chosen. It was noted that the smaller the card holder, the better it looked. A 1¼ in. by 2⅞ in. (size of card) card holder was the size used.

The wood samples were placed in the holders and arranged on the board. A card holder was placed below each sample to determine the spacing that would be suitable. It is noted that the holders were fastened from the back. Three 9/32 in. holes were drilled all the way through one holder, one being drilled into each of the vertical pieces and one being drilled slightly off center of the horizontal piece. By means of spacer blocks, the holder with the holes all the way through was placed exactly where each of the other holders were to be placed on the mounting board. An awl was used to mark through the holes, thus locating where to drill through the mounting board. In this situation an extra holder was used as a jig. Three pilot holes were drilled in each of the 24 wood sample holders in positions corresponding to those in the wood sample jig. They were fastened with ¾ in., No. 5 f.h.b. wood screws. All pilot holes used to hold the card holders in place were located by means of a jig. The card holders were fastened with ¾ in., No. 2 R. H. Brass wood screws. A thin piece of transparent plastic was placed in each card holder to keep the printed card clean.

A 2¼ in. by 5 in. (size of card) card holder was placed directly behind the wood sample so that when the sample is removed some of the pertinent information can be read, such as whether it is hard or soft, where it grows, what it is used for, etc. This information was typed on index paper, and a thin, transparent piece of plastic was placed in front of the typed material, but still inside the card holder. This kept the typed material clean.

The title "Wood Identification" was printed in 1½ in. black letters on a ¼ in. by 2¾ in. by 20 in. hard maple strip. For a finish the par-flake and the wood holders received one coat of sealer and one coat of low luster lacquer, and were rubbed with steel wool. ◀



SALAD SETS

BEN HUNT

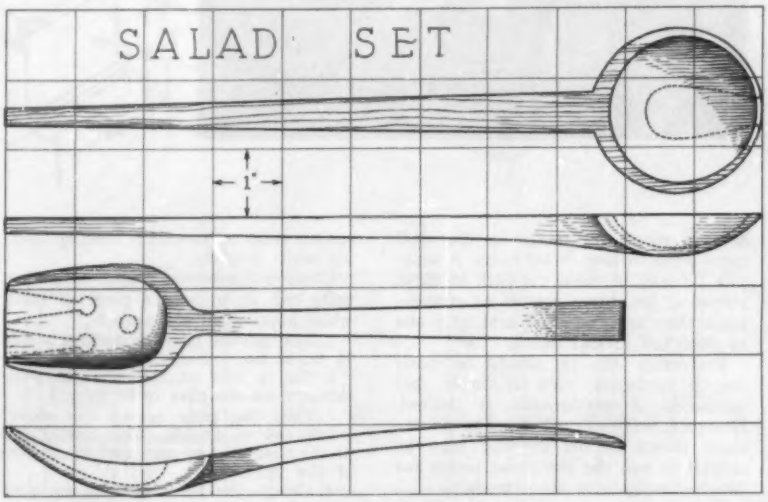
Hales Corners, Wis.

All whittling is fun, and while for the most part, we usually whittle objects that are purely ornamental, it is also a good idea at some time or other to make something that is useful. And wooden forks and spoons come under that category.

The two salad sets shown here were made of some cherrywood, that I know is over 50 years old. Cherrywood is fine grained and is easily worked. Most of the commercial forks and spoons and ladles are usually made of birch, so if you don't have cherry, you will find birch quite easy to work also. Walnut has a peculiar "taste" and mahogany has too open a grain.

After sawing out the blanks, the best way to hollow the bowls is with a crooked knife or a spoon gouge. When the bowls are finished, saw out the forks with a hand coping saw. You will find it much easier that way, instead of sawing out the forks first. Sand them smooth and wet them to raise the grain. Sand smooth again. To get a real nice finish, this wetting and sanding can be done several times.

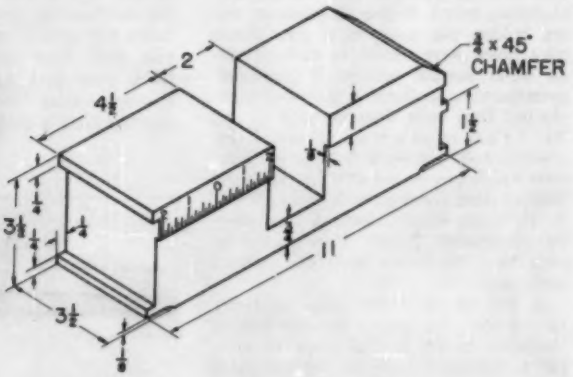
For the final finish I always give them several good coats of mineral oil, letting each application soak in well. After that they can be washed in the usual way, and there will be no lacquer or other finish to chip off. A good salad oil will work equally well. ◀



A DUAL PURPOSE JIG

FLOYD ERICKSON
Graduate Student, Industrial Arts Department
University of North Dakota, Grand Forks

This useful simple-to-make jig for machine woodworking has been designed to serve two purposes: (1) to facilitate the jointing of wood end or side grain without splintering, and (2) to aid in holding stock accurately in the drill press while drilling dowel holes. A separate jig may be made for each of these purposes, but for a matter of convenience they may be combined into one as described in this article.



Preferably, the jig should be made out of hardwood, such as maple, and laminated if permanence is desired. However, softwood will do. The dimensions shown in the drawing may be altered to suit the particular pieces for which the jig is to accommodate.

The first step in making the jig is to square the sides to shape. Next, cut the ends and center to shape, a disk sander may be used to square the ends. The ends must be square and even so that the work may be clamped tightly against them to prevent it from splintering while jointing.

Observe the following procedure when using the jig to hold a piece of stock while jointing its end grain:

1. Saw out the piece of stock to within ⅛ in. of the cutting line.
2. Use a vise to hold the jig while clamping on the piece to be jointed.
3. Place the piece against the appropriate end of the jig. The cutting line on the piece must be even with the bottom of the jig.
4. Clamp the piece securely in place with either a no. 1 or no. 2 hand screw clamp. Make sure it is held tightly against the bottom of the jig where the jointing is to be done. Always check this before jointing.
5. Do not joint more than ⅛ in. off with each cut. Two lighter cuts will produce a smoother surface. For the final cut be sure the depth of cut is set flush with the limit of clearance under the jig in order to remove all small splinters resulting from previous cut. However, for most purposes the depth of cut may be set so that only one cut is needed and then the piece may be passed over a second time for a final smoothening without resetting the depth of cut.
6. Be careful not to joint into the jig during each cut.
7. Jointer knives must be sharp for this operation — dull knives are dangerous and produce rough cuts.
8. (CAUTION) Keep the jointer guard on at all times.

Observe the following procedure for drilling dowel holes into two pieces of stock to be held together with one dowel.

1. Select a wood bit having a sharp point in order to insure accurate alignment of the dowel holes. Do not use an ordinary twist drill.
2. Clamp the jig securely to the drill press table. The drill bit must align with the zero mark on the jig and be of adequate distance from the jig, depending on the thickness of the piece to be drilled.
3. Hold one piece of stock in place with its face surface against the jig and joint end tight up against the ledge.
4. Align the face edge of the piece with the jig graduation mark at the distance desired from the zero mark.
5. Clamp the piece on securely with a C clamp.
6. Drill the hole to the depth desired.
7. Remove the piece.
8. Hold the adjoining piece of stock in place, as in step no. 3.
9. Repeat step no. 4 measuring the *same* distance from the zero mark, but in the *opposite* direction to the face edge.
10. Repeat Step No's 5, 6, and 7.

Following the above procedure will insure accurate alignment of the pieces when the proper dowel is inserted. Observe the same procedure in drilling holes for each dowel in an end joint requiring more than one dowel. The location of the dowel holes on pieces to be fastened edge to edge should be marked prior to placing each piece in the jig for drilling.

VARIABLE CAPACITANCE BOX

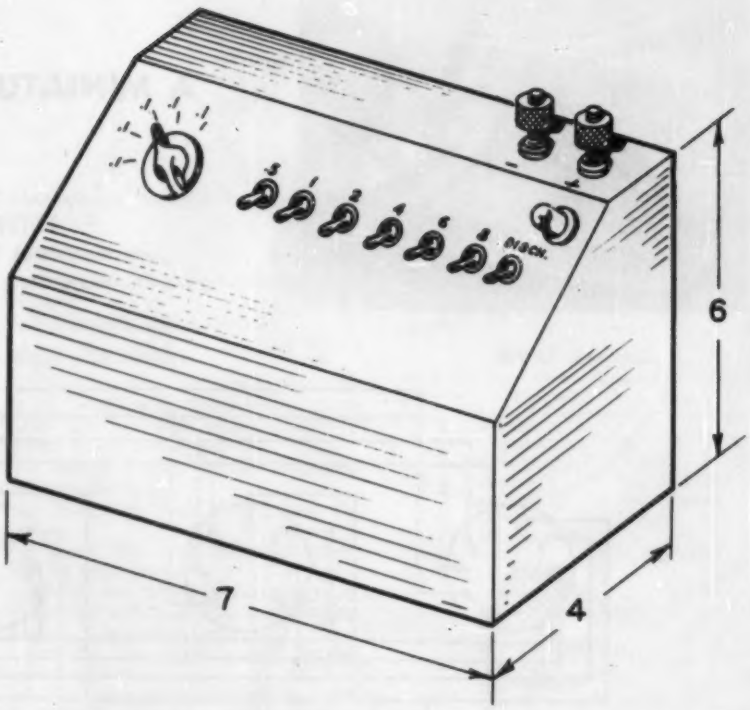
ISAAC P. HAMPTON, JR.
Assistant Professor, Industrial Arts Department
University of Florida, Gainesville

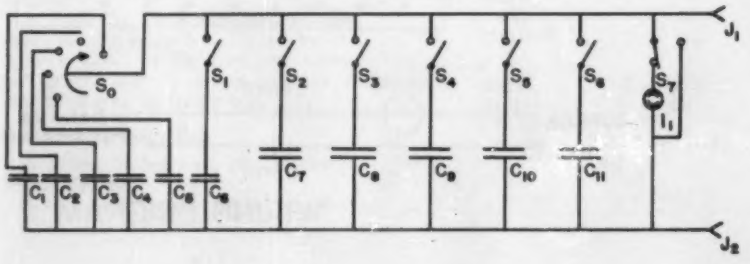
It is often convenient to have available a supply of capacitors of different values, especially when illustrating time constants, reactance, impedance, and resonance in a.c. circuits. The variable capacitance box described here has been found to fill this need satisfactorily, as it will provide any value of capacitance from .1 mfd. to 22 mfd. in steps of .1 mfd. The complete unit may be constructed in the typical school shop at a very moderate cost.

The capacitors are paper tubular, ceramic, bathtub case, or oil filled. Many excellent capacitors of 1 mfd. and larger may be obtained from surplus sources at a small fraction of their real worth.

The case may be of metal or ¼-in. plywood. A finish of hammertone enamel or wrinkle varnish lends a professional appearance to the instrument. Dimensions shown are only suggestive, and will depend on the space needed to house all the condensers. Safeguard against the hazard of accidental shock from a charged condenser is provided in the circuit controlled by S_7. In position 1 condenser current is discharged through the neon lamp I_1. This also gives a visual indication of the condenser action. Since a neon lamp ceases to conduct when the impressed emf drops below approximately 60 volts, S_7 may then be thrown to position 2, which completes the discharge.

The writer has found this instrument to be a useful addition to the teaching aids employed in basic electricity courses.

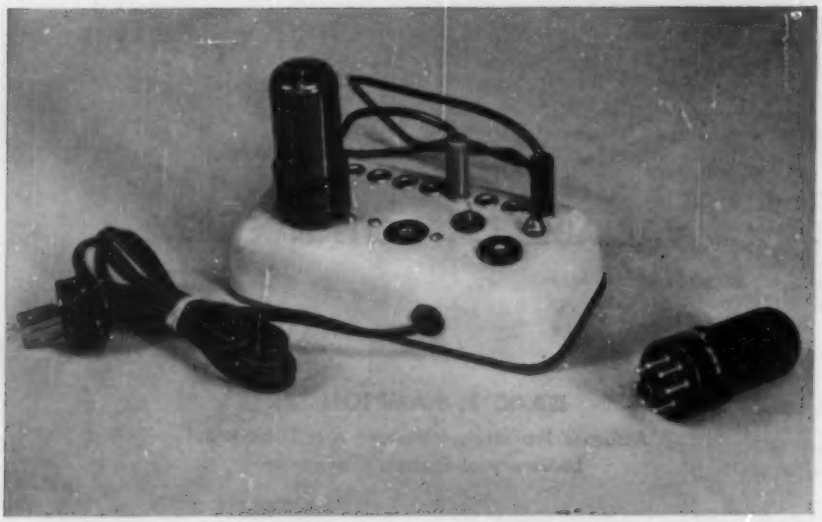


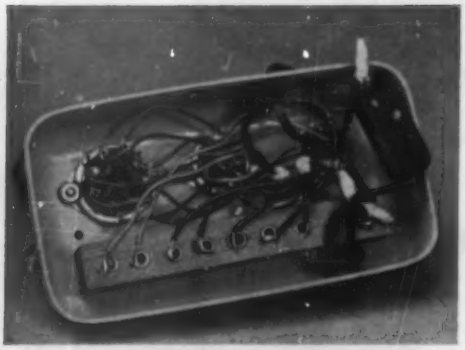


PARTS LIST:

S_0	5-position wafer switch with shorting arm.
S_1-S_6	SPST toggle switch.
S_7	SPDT toggle switch with spring return: center-off.
C_1-C_6	.1 mfd
C_7	.5 mfd
C_8	1 mfd
C_9	2 mfd
C_{10}	4 mfd
C_{11}	6 mfd
C_{12}	8 mfd
I_1	NE 51 neon lamp
J_1-J_2	5-way binding post, one each red & black

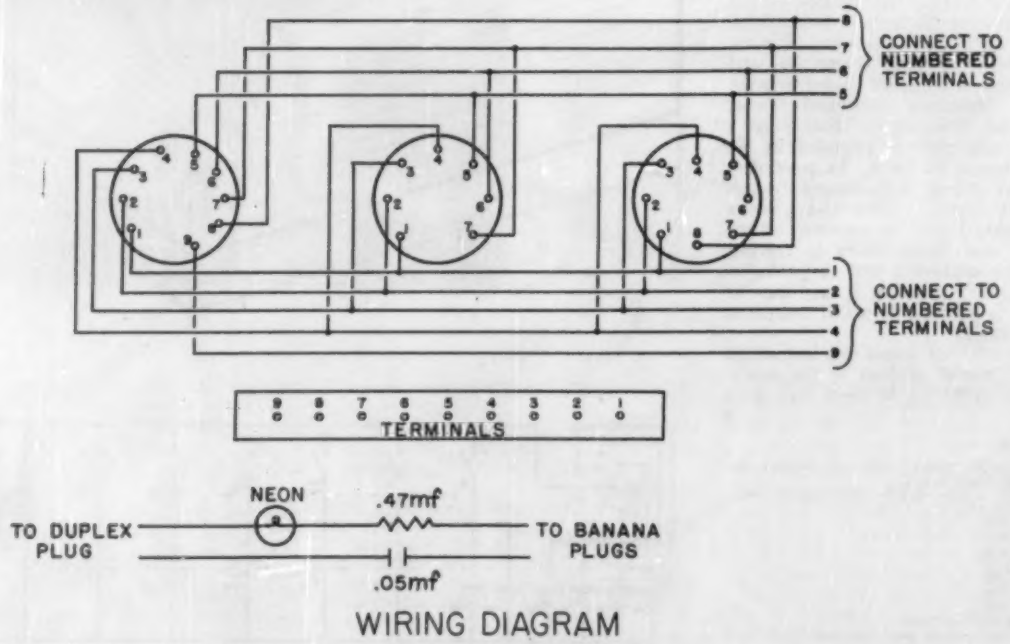
NOTE: All condensers should be of 400 v. d.c. working voltage or higher.



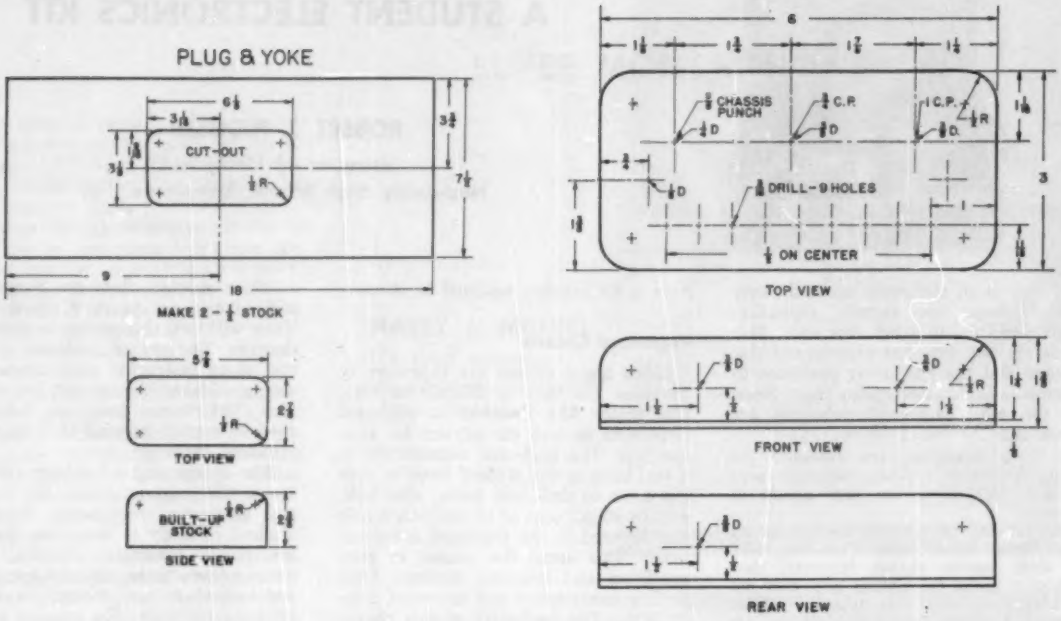


A MINIATURE TUBE TESTER

PETER A. FULCER
Production Planning Understudy
Kimberly-Clark Corp., Memphis, Tenn.



WIRING DIAGRAM



Many teachers in the field of electricity and elementary radio seek new and different projects to add to the usual basic instructional units involving construction of crystal radio sets. The miniature tube tester described in this article is inexpensive and simple to construct. In addition, it provides each student with experience in reading diagrams, wiring, and soldering. The student also has an opportunity to work with plastic or wood in creating the box which contains the tester, or to convert a commercial box to appropriate type and size.

A project which will stimulate student interest, the tester may be regarded as a small individual instructional unit or as an incentive project for more able students. When completed, it is handy for shop or home use and will test the filament or continuity of any seven or nine pin miniature tubes, as well as of the standard octal tube. A capacitor has been included as a specific safeguard against the possibility of shocks.

Plastic Box Construction

1. Obtain plastic ⅛ by 4½ by 8 in.
2. Make a plug and yoke as shown in the drawing (instructor only).
3. Stretch form the plastic over the plug and, using a slitter saw, cut the box to 1¼ in. depth.
4. If equipment for working plastic is not available, the student can make the tester box of wood, using inside dimensions 1⅛ by 5¾ by 2¾ in. A commercial wood or plastic box of appropriate size can also be satisfactorily converted.

Box Hole Layout

1. Lay out all holes as shown in the drawing.
2. Carefully drill all holes.

Major Construction

1. Lay out and drill nine 5/16-in. holes in the wood stock, being certain these holes line up with holes previously drilled in the tester box.
2. Fasten (using eyelets) the wood piece to the box.
3. Mount all tube sockets into the box.
4. Insert the three rubber grommets and the neon lamp.
5. Wire and solder all connections in accordance with directions in the wiring diagram. Use hook-up wire.
6. Solder the capacitor and the resistor in place.
7. Cut two pieces of lead-in wire 18 in. long. Connect a banana plug to one end of each and solder the other end to the correct lead as shown in diagram.
8. Push the lamp cord through the hole provided in the box. Tie an "underwriter's knot" in the cord and solder the other leads in place. Connect a duplex plug to the other end.

Bottom for Plastic Box

1. Trace the box on a piece of hardboard. Cut out.
2. Cut from small pieces of fiber tubing two spacers 1⅛ in. long.
3. Drill and countersink two holes in the hardboard.
4. Fasten the hardboard to the box, using the machine screws and cap nuts. If necessary, cut the screws to exact length.

Bill of Materials

Quan.	*Material*	*Size*
3	rubber grommets	⅜"
1	neon lamp	NE–2
9	eyelets	5/16" D. x 1⅛"
1	resistor	470,000 mmf.
1	capacitor	.05 mf.
2	banana plugs	
1	wood	¾ x 5⅝ x 4¾"
1	octal tube socket	
1	seven-pin tube socket	
1	nine-pin tube socket	
4	screws and nuts	4–40 machine screws
1	duplex plug	
1 yd.	lead-in wire	
2 yds.	hook-up wire	
4 ft.	lamp cord	
Plastic Box		
1	plastic	⅛ x 4½ x 8"
1	hardboard	⅛ x 3 x 6"
2	F.H. machine screws	6–32, 1½ in. long
2	cap nuts	6–32
2	spacers (scrap)	1⅛ in. long

A STUDENT ELECTRONICS KIT

ROBERT J. MOUSER
Instructor of Electricity
Neshaminy High School, Langhorne, Pa.

Today is an electronic age and many school shops are rapidly expanding their facilities to meet this end. This writer is one who has experienced this change and has had many problems to overcome in his electronics shop. Some of the most important problems are those that are listed below:

1. It is sometimes too expensive for many schools to purchase electronic supplies in "kit" form for large groups of students.

2. Students can learn to wire basic circuits "bread-board" style. When they work in their regular chassis, however, they cannot visualize the circuits since they are not familiar with this type of circuit layout. Although breadboard circuits are the cheapest to construct (no chassis cost is involved), they defeat their purpose when the student starts to work on commercial chassis.

3. Storage of small, easily lost parts are a problem to the student. He also needs space to store his schematic circuits and notes.

4. Distribution of small capacitors, resistors, etc., are not easy for the teacher unless he has a place to put them where the student will not lose them.

5. An electronic circuit is not an easy project to store since it entails odd shaped parts, delicate components, and intricate wiring.

6. If the student drills a lot of holes in a chassis for one circuit, these holes are usually not in the correct places for the following circuits.

Although this student electronics kit is not a panacea for all electronic shop problems, it has *eliminated all* those listed. This "kit" will store all parts, the chassis (either wired or partly wired), the student schematic drawings; and it will protect them until the next class meeting. There can be no mix-up of chassis or kits either since all of them are numbered and the students have a kit number assigned to them.

Pegboard Chassis

Since metal chassis are expensive to purchase (as well as difficult to cut), the writer has designed a pegboard chassis to fit into the project kit storage box. The pegboard construction is a real boon to the student since he does not have to drill bolt holes, wire hole, etc. In 90 per cent of all circuits, a hole can be used in the pegboard for every need! This keeps the chassis in good condition and prevents students from drilling unnecessary and unwanted holes in them. The best part of this chassis is the fact that the student learns the commercial type of chassis wiring (both above and below in one circuit).

The two storage compartments (see drawing) in the kit keep the student's parts at his finger tips at all times. This prevents much loss and damage. The electronic shop instructor can even distribute parts into the compartments while the students are not in class. He can also make a quick "kit" to suit his curriculum needs by passing out the parts that he wants the student to use for this particular assigned circuit.

Since the chassis and storage compartments are all standard, the instructor can design and adapt all of his circuits to suit these sizes.

In a relatively short time, the instructor can reproduce (by mimeograph or ditto) all of the necessary schematic circuits on standard 8½ by 11 in. duplicator paper. This paper will easily fit into the lid of the storage case and can be securely fastened in place to the corkboard by the use of four thumbtacks. This will protect the sheets and insure against loss.

These storage cases are rugged and will take many years of hard usage. They will lend themselves to mass production. To further facilitate storage, the shop instructor can construct a storage cabinet for all of the storage bins. The storage boxes or "kits" can then be merely inserted as if they were standard drawers.

The chassis and its storage compartment will accommodate all standard size electronic components. When the student is ready to leave the class, all his parts, schematic circuits, notes, chassis (even those partially completed) are housed in one storage cabinet in its assigned place. The number painted on the front of the "kit" will enable the instructor to check the student's progress at his convenience.

Bill of Materials

Storage Case

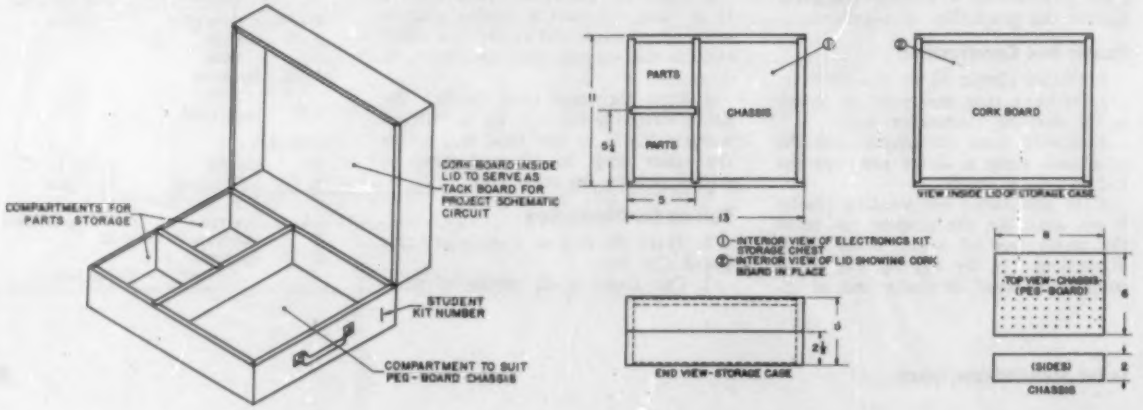
Quan.	Part	Material	Size
3	Ends and parts bin divider	Pine	½ x 5 x 11 in.
2	Front and back of case	Pine	½ x 5 x 13 in.
2	Top and bottom of case	Masonite	⅛ x 11 x 13 in.
1	Top interior tack board	Cork board	½ x 11 x 13 in.

Chassis

2	Sides	Pine	½ x 2 x 8 in.
2	Ends	Pegboard	¼ x 2 x 6 in.
1	Top	Pegboard	¼ x 6 x 8 in.

Hardware

2 Hinges surface type (for case lid)
1 Small brass hook (to latch storage case)
4 Thumbtacks (to secure the schematic circuits to the corkboard)



SUPER MONTAGE MAKING

HARRY J. MILLER
Retired Instructor,
Bok Vocational School,
Philadelphia, Pa.

Few subjects provide as meaningful a photographic experience on the industrial arts exploratory basis, or in the field of vocational training, as the making of montage prints.

Montage-making-composite pictures in which two or more figures or poses appear on one sheet is a critical job since the exposure for all negatives must be right on the button to insure uniform density for each figure.

When dealing with a number of negatives, even these may vary in density despite every precaution. And in schools which generate their own electricity, or where there is inadequate wiring, voltage fluctuations complicate the problem. Thus the student of photography must learn to be alert to hazards which will render his final prints lacking in professional excellence.

On the vocational basis, the serious photographer-to-be learns a never-to-be-forgotten lesson against the time when he operates his own studio, especially if this be at home.

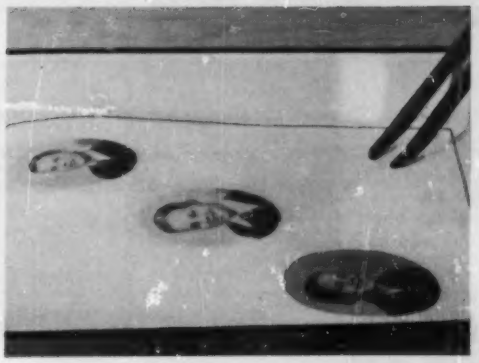
When a home appliance that draws heavy current starts up, the voltage falls, correct exposures are riddled, and needless repetition becomes the order of the day. Also when it comes to varying the exposures during the enlarging process, this process may compensate somewhat for density differences, but even then some of the figures may come up faster than others.

This vexing problem is resolved by teaching the student first to make the exposures as carefully as possible in the shop's enlarger. Put the paper into a slow-working developer until the images just begin to show, then remove the print from the developer and place it face up on a smooth board near the safelight.

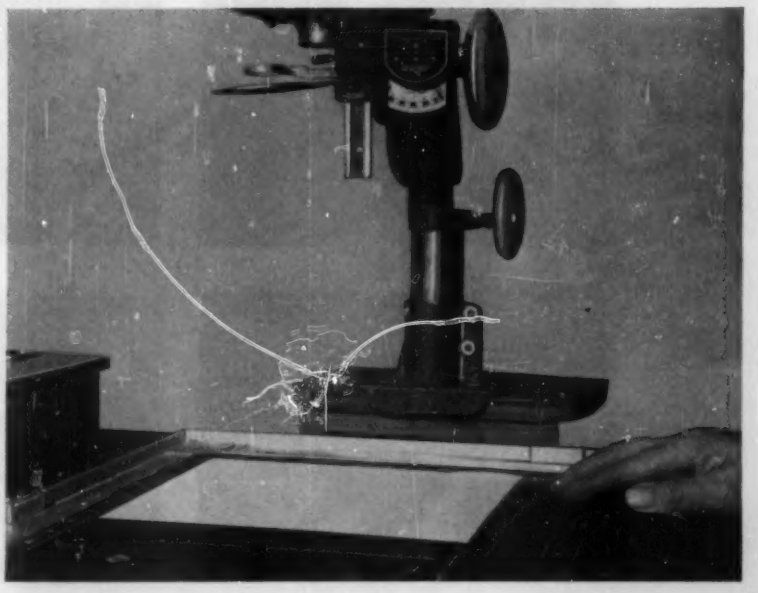
With a swab of developer-soaked cotton in one hand and one soaked with hypo in the other, apply developer to areas which lag in coming up — keeping an eye meanwhile on the other figures. When a figure attains the desired density, use the hypo to stop further development. Continue this process until all the figures are uniformly developed, then place the print in hypo and resume conventional fixing, avoiding undue handling that might stain the print.

In using the enlarger, it may happen that two prints with the same exposure from the same negative, have different tones. The reason for this is, most likely, the voltage variation referred to above.

This may be circumvented by mounting a light meter temporarily or permanently at and on the enlarger. Thus any voltage fluctuations will be noticeable on the meter and thus serve as a guide to the proper rectification of exposure time required to compensate for the voltage variation.



Step 1 (below), make the exposures as carefully as possible in the enlarger. Step 2 (right), place the paper in a slow-working developer until the images begin showing, then remove the print and process it. Step 3 (above) subject the paper to the conventional fixing process when treatment is completed and all heads have obtained uniform development.



THE ARCHITECTURAL MODEL: A NEW METHOD OF CONSTRUCTION

HERBERT C. SIMONSON
Instructor of Mechanical Drawing
William Hall High School, West Hartford, Conn.

Building scale models from plans is certainly no new project in the high school mechanical drawing programs; however, here is a method that is simple, easy and fun, but at the same time one that requires care of construction and allows for individual imagination. The conscientious student can produce a scale model that, although made of homely, inexpensive materials, is accurate, realistic, and attractive. Once finished the houses are ideal in-school and out-of-school publicity.

Besides seeing their projects displayed in our school showcase, Hall High School mechanical drawing students were invited, through previous arrangement by their instructor, to compete for cash prizes at the 1960 Hartford Home Show. There, over 50,000 people saw their houses and 10,000 visitors voted by number for the top three. Also through teacher arrangement some models were displayed at local banks, while some others were entered in the Connecticut Industrial Arts show where one student won top honors in the drafting division and became eligible to compete in the Ford Industrial Arts Award Fair at Dearborn, Mich. Local papers recorded with pictures and articles all of these events. Our students' work was highly successful because the student gained personal satisfaction as well as public recognition for his work. By saving several models the instructor has the perfect motivation for next year's students.

1. Cut out walls of house, using razor blade and steel straight edge.

2. Lay out all glass areas.

3. Draw in window bars using a white pencil.

4. Coat walls with a thin coat of rubber cement.

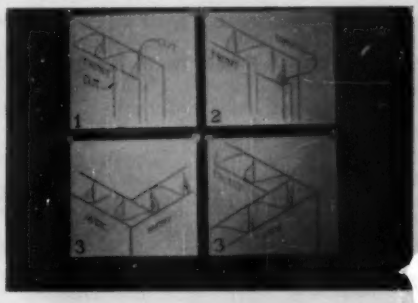
5. Cut window and door frames from board.

6. Apply the horizontal siding, making them as wide as previously drawn guide lines.

7. For vertical siding, select oil stain for color, rub across white paper with cotton moistened with stain and allow to dry.

8. Apply a strip of gray paper to simulate foundation.

9. Apply vertical siding in one piece.



10. Lay out and cut the corner joints; then glue the side walls together.

11. Lay out bottom piece by marking four corners, then cut out with blade.

12. Glue bottom into place with cement.

13. Build the roof in the same way as walls, then line colored paper, cut shingle width on wax paper.

14. Apply strips of roofing making sure to stagger tab lines.

15. Apply roof edging strips to roof.

16. Cut steps from cardboard; build up chimney from layers, prepare brick paper by lining red paper with white pencil then glue.

profiles in industry

This survey on an industry basic to industrial education forecasts trends in the graphic arts and spotlights technological developments as well as manpower requirements, with implications of these facts for teachers —

Graphic Arts

SAMUEL M. BURT

Never in the history of the graphic arts industry has so much money, effort, and time of so many people been allocated as at present to provide new and improved techniques, processes, tools, and equipment to produce printing faster, better, and cheaper. As a result, we can expect greater changes taking place in the printing industry during the next decade than in all the decades of the past 500 years. These changes will be felt in every phase of the industry — in its very nature, its manpower requirements, its approach to sales, production, marketing of its products and management of its personnel.

The complicated printing equipment, already appearing in printing plants, demands new levels of judgment, experience, and a higher and broader range of knowledge. In tomorrow's printing establishment, we will be meeting college trained personnel, technicians, engineers, chemists, and physicists performing specialized tasks rather than, as at present, depending on craftsmen and supervisory staff who gained their experience and knowledge on the job. Yet with all this mechanization and specialization, printing will remain essentially a custom manufacturing business. Craftsmanship will achieve even higher levels of creativity and will preserve those human values, the personal regard and the pride of well-ordered effort which has been the tradition of the printing industry.

Here then is the profile of the graphic arts industry, as envisioned by both leaders and students of the industry, for the next several decades:

1. Greater mechanization, automation, and utilization of the sciences and scientific techniques, insofar as the production of the printed product and all its elements are concerned — presses, papers, plates, inks, etc.

2. More emphasis on the aesthetic elements inherent in the printing process as well as the product, together with increased dependence on craftsmanship, quality and precision at every stage in the planning and production of the printed product.

To the uninitiated, these two trends might appear at cross-purposes. In reality, this is simply the orderly evolution of the graphic arts industry ever since it became an industry with Gutenberg's discoveries. However, there is a significant difference between the graphic arts industry of the next few decades and the industry as we have known it in the past. This difference may be characterized by the utilization of instrumentation in its control of production and by the predominance of technically and professionally trained manpower who will function as specialists rather than printers, as in the past, and even today. What these changes in graphic arts industry are, and what their implications may be for graphic arts educators is a matter of prime importance at every level of the graphic arts education program in our school system. A presentation of some of the major highlights in the technological development of the graphic arts industry will make this clear.

Mr. Burt is managing director of the Education Council of the Graphic Arts Industry, Washington, D. C.

Composing Room

Photography and electronics are phenomena affecting almost every operational phase of the graphic arts industry and will be referred to time and again in these pages. While they are just entering the composing room, they are already major factors in the planning of the composing room of the future. The Fotosetter machine, introduced in 1949, was the first commercial photographic typesetting machine offered to printers. The machine, similar in appearance to a hot metal composing machine, is a complex marvel of electronic engineering. The matrices of the the machine contain transparent images instead of incised characters. By exposure to a turret-type camera, the images are photographed in a number of possible sizes; the product of the machine is a photographic image. Other phototypesetting machines are rapidly being put into use. Machines for setting display composition by use of photographic techniques are also in use. The Brightype process uses the type form directly as photographic copy.

In using photographic composing machines, the skills of the machine compositor are reaching even higher levels than ever before. He must determine, quite exactly, relying on his experience and the use of copy-fitting scales, such matters as size of type, width of line and amount of leading. The need for exact specifications is more important than with metal types which easily permit manipulation.

Effects similar to hand-lettering can be obtained by photographic distortion of copy. Letters can be slanted in any direction, extended or condensed, distorted with perspective, or produced with a variety of shadow effects by manipulating the camera.

Typewriter-style typesetters are also achieving dramatic results in preparing copy. They provide electromatic manipulation, proportional spacing, and a variety of type styles and sizes which can be easily changed. One interesting application of these "cold-type" type-

setters (as differentiated from phototypesetting and hot-metal typesetting) is their use in electronic computing machines for typing their results, as rapidly as the computers come up with the results. These "cold-type" typesetters are used in the preparation of reproduction proofs, direct image offset plates, and in combination with reproduction proofs from hot metal composition. They portend great things for offset lithography.

The use of photographic processes in the composing room, has required the development of new skills on the part of craftsmen in other departments of the printing plant. For now, instead of handling type, we find photographic paper and film materials. These materials have introduced a flexibility in newspaper, commercial printing, and magazine production which add up to the saving of many hours of time when compared to present techniques. This greater flexibility, and less costly production, should result in greater utilization by the business world and the general public of the products of the graphic arts industry.

Platemaking

The equipment, methods, and materials engineered for platemaking operations are as spectacular as the developments taking place in the composing and press rooms. The introduction of plastics, new metals, new metal alloys, instrumentation, and control techniques has brought far-reaching changes that have increased the life and printing quality of plates.

Electrotyping, for example, has been revolutionized by substituting a plastic molding material for the wax, lead, and graphite formerly used.

Offset lithography is looking forward to even greater advances with the use of deep etch, polymetallic, and presensitized plates.

Photoengraving is seeing spectacular new developments with powderless, one-bite etching techniques for magnesium, zinc, and copper plates. The photosensitive plastic printing plate, whose commercial application is just beginning, is another dramatic advance in the photoengraving process.

Electronic devices have been developed for faster and more accurate preparation of color or black-and-white line and halftone plates. In one type of such electronic equipment, the final plate itself is made directly from original copy. In another type, electronic principles are applied to the preparation of photographic materials which are then used in the normal platemaking procedures.

Rubber has come in for a substantial part of the printing plate business. Rubber plates have been used for coarse printing for many years, but new rubber formulae — permitting the use of a wide variety of inks — has resulted in widespread application in the printing of package wraps, pocketbooks, film, metal foil, and certain types of commercial printing.

The use of wire and radio for high speed transmission of copy and pictures by news services and other industries presages the ultimate use of printing plates to receive the transmitted image. Several years ago a color picture of a parade was printed in a newspaper with the color separations made by photographing the television monitor in the broadcasting studio. Further experimentation may certainly be expected for the emphasis today is fast reproduction of news stories and pictures — no matter in what part of the world the event may take place.

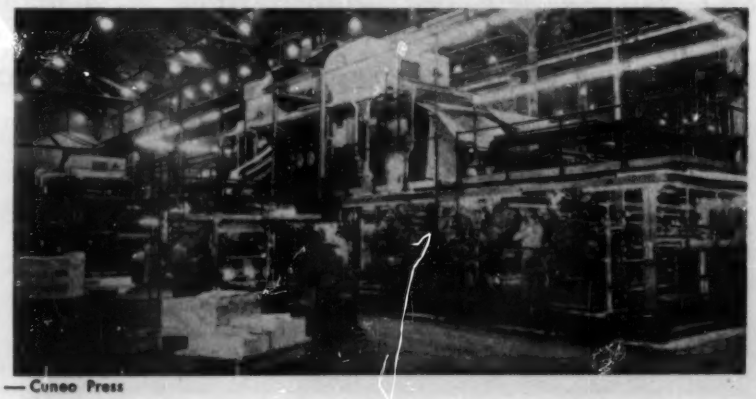
It is in the field of color printing, however, which has brought about the greatest conceptual changes throughout the printing industry, and the greatest impact of these changes may well be in the plate-making operations of every phase of the industry. The shift from printing single colors, dry, to multi-color printing on high speed presses has made a significant difference in the preparation of plates. Photographic improvements, new concepts of lighting, the use of new materials, utilization of the fields of chemistry, physics, electrostatics, and electronics are all playing a part in making possible new, lighter, easier-to-handle, more accurate printing plates. Students of the graphic arts industry claim that the technical developments taking place in platemaking have a fascination unequalled by any other phase of the graphic arts industry and are bringing about unparalleled teamwork among craftsmen, technicians, engineers, chemists, and physicists. All toward the goal of meeting the demand for faster, better, less costly printed products.

Presses

Even in this day of jet-age travel, most of us marvel at the speed of a modern magazine printing press. Using more than a seven-mile ribbon of paper every 2 minutes, running continuously for many hours, utilizing photoelectric cells which insure automatic page register, web position, back-up, folding and cutting — these presses, in a matter of seconds, convert blank paper into signatures for a magazine containing four color printing with ink dried on both sides of the page, and ready for delivery to the bindery. Not only would our forefathers be amazed at this speed, we today are continually intrigued in watching this operation.

— Franklin Technical Institute

A high degree of mechanization characterizes the developments of the graphic arts industry as indicated in the contrasting views of "Franklin, the Printer" and a modern pressroom.



— Cuneo Press

Mass production printing on web-fed, as well as on sheet-fed presses — in black and white as well as in color — is being produced by a variety of presses by each major printing process — letterpress, lithography, gravure, and silk screen. To make this possible press designers (1) are utilizing new lightweight metals for the press and its component parts. (2) have developed new paper and ink feeding and control systems and new ink drying systems, and (3) installed electric circuitry controls which demand of the pressman more and more technical knowledge and ability than even envisioned ten years ago. Today a pressman must be more than a craftsman. He must be a trained technician fully capable of controlling an intricate and complicated mechanism designed to produce a high quality product at a fantastic speed. And the most amazing thing about all this effort is our goal of putting a very thin film of ink on a thin sheet of paper!

Bindery

The bindery and finishing departments have paralleled the technological growth developments of the other phases of the printing industry. The radical improvements in materials and machines, which have made such productivity — and not so incidentally, a higher quality product — possible, have touched every operational step in the bindery. This is true of the bindery specializing in case-bound books, as well as in the commercial printing bindery. While some of these developments took place prior to 1940, the most important have taken place since that year. In the past 15 years, these developments have increased the productivity of the bindery worker by almost 100 per cent and, in turn, have more than doubled his wages. Stitching, cutting and trimming, folding, gathering, sewing, casemaking and casing-in, covering, and die-cutting and mounting operations have all been brought to an extremely high degree of mechanization in the past several decades. In addition, new materials such as adhesives for perfect binding — the type of binding which holds the back of a book together with adhesives only — have helped speed up production and lower costs of such types of publications as catalogues and telephone directories which would otherwise be prohibitively costly. Advertising displays, which present a wide range of production and construction problems are now "big business" for the binderies of the printing industry, and require new, specialized techniques and machinery. Here is a fast-growing phase of our industry requiring truly ingenious craftsmen.

Paper and Printing Inks

As the printing industry increases its production capacity, the paper industry will find ways and means to meet the demands. With the increasing demand for quality, illustrations, the greater use of web printing, and wider use of color, papermakers are being called upon to provide qualities other than strength and appearance in their product. Paper industry chemists and engineers have provided paper for the printing industry with better finishes, more uniform texture and thickness, tensile and bursting strength, pick, resistance, opacity, brightness, cleanliness, and other elements as required. There has been and will continue to be more and more co-operation between the various facets of the printing industry and the paper and ink industries to co-ordinate their research activities and new developments.

Printing and Publishing Industry

Major Groups	*Total No. Employees*	*Total No. Companies*	*Total Annual Sales Volume*
COMMERCIAL JOB PRINTING *includes advertising material, direct mail, post cards, calendars, posters, greeting cards, labels, cartons, catalogs, maps, etc.*	418,300	30,000	$ 5,600,000,000
NEWSPAPERS *2000 dailies; 10,000 others; 1 to 2 billion issues per month*	317,000	8,000	$ 3,330,000,000
PERIODICALS *includes magazines, business publications and form papers, 13,000 published; 500 million circulation per issue in aggregate*	61,800	2,000	$ 1,425,000,000
BOOKS *Fiction, trade text, religious — 500 million annually. Booklets — 500 million annually*	56,200	200	$ 1,100,000,000
Totals	853,300	40,200	$11,455,000,000

During the past few decades the printing ink industry chemists have provided us many new developments in printing inks. This has been particularly true in the creation of new brightly colored inks and in the adaptability of inks for printing on plastics, foils, and other new materials. Several years ago the National Printing Ink Research Institute was established at Lehigh University to do both basic and applied research in the manufacture and utilization of printing inks.

Many hundreds of chemicals go into the manufacture of many different kinds of printing inks, and this story, like the manufacture of paper, might well deserve consideration in a separate treatise in this series.

Manpower Requirements

As in the above discussion of the technological developments taking place in the printing industry, we can only highlight some of the considerations which will affect its manpower requirements during the next few decades.

Current estimates of the distribution of manpower throughout the major categories of the printing industry indicate employment of over 850,000 people.

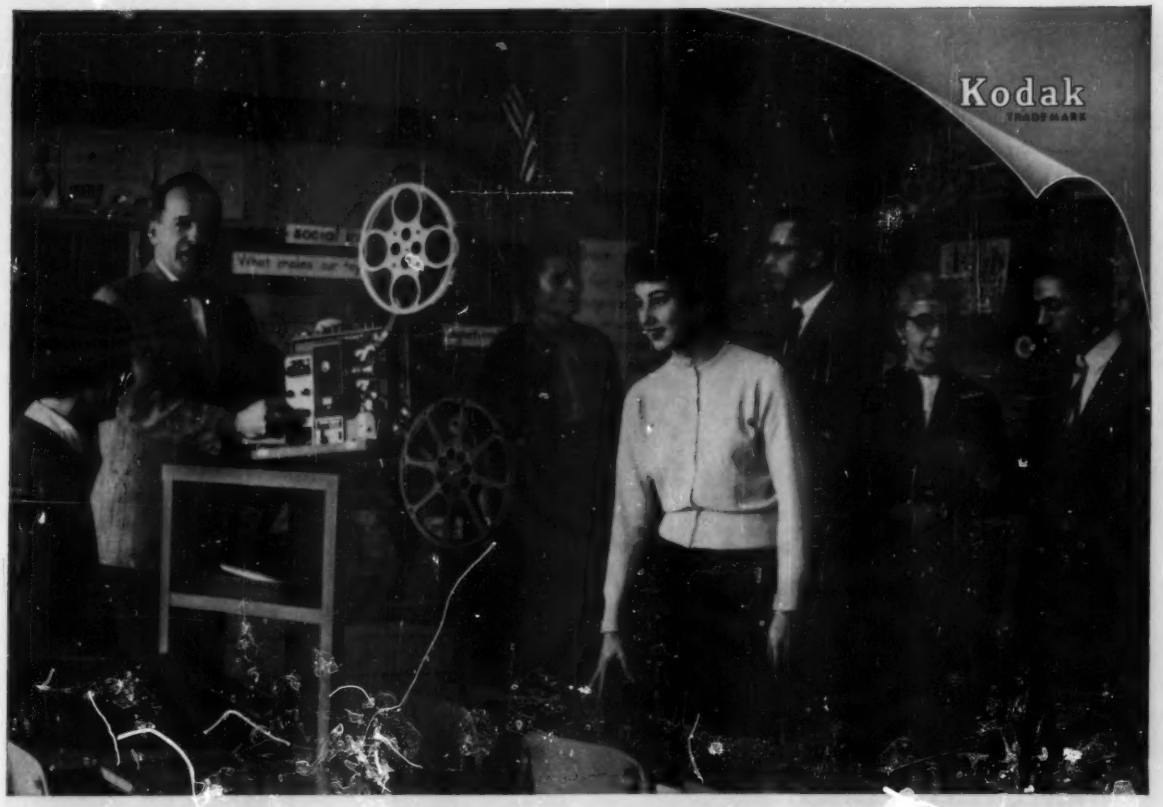
It is also estimated that by 1970, the printing industry's man power will increase to a total of at least 1 million. The question facing us is what kind of new people will be coming into the printing industry and will they be provided with the proper educational and training background to meet the challenges of the technological and managerial evolution taking place within the printing industry.

Implications for Teachers

College trained managerial personnel for the printing industry are in short supply right now. Colleges offering majors and degree programs in printing management have for several years reported considerably more job openings than available graduates. To meet the demand for this type of personnel, a number of additional college programs are under study in various parts of the United States, including graduate school programs in printing management, printing engineering, and printing teaching.

But what about education and training for people who will need to perform jobs which we can't exactly describe on equipment which is just coming off the design boards for printing plants to be built during these next few decades. Educators, of course, are faced with this same problem for other industries, and it is not too farfetched for them to plan educational and training programs along the same lines for the

(Concluded on page 55)



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(For more information from advertisers, use the postcard on page 65)

NEWS

(Concluded from page 8)

student's educational program are completed in a technical institute program. At present, graduates in architectural drafting, automotive technology, machine drafting, machine tool technology, printing technology, and radio and television technology may elect to continue their education and become qualified to teach the subject of their specialization. Upon graduation from the institute the student may spend three months in employment in the occupation in which he has been trained. After this he returns to the campus for three quarters of regular college courses before going to work for the summer again. He then returns to the campus for his fourth year of college work and at the completion of that returns to his occupation for 12 to 15 months. After this the degree is conferred. Optional scheduling of the college-job sequence is allowed: hence, a student may go to school straight through the summers and complete his job requirements in one lump after all the college course work is finished. In all cases, a minimum of 18 months supervised employment experience in the trade must be completed.

industrial education conference

The seventh annual Industrial Education Conference was held on the campus of Stout State College, Menomonie, Wis., October 11. Sectional meetings offered in varied aspects of industrial education to meet the needs of as many conference participants as possible included:

"Use of Drafting Machines in the School"; "Post-High School Industrial and Technical Education"; "Layout for Reproduction in Graphic Arts"; "Foundry Today — Suggestions for Units in School Shops"; "The Oscilloscope as a Teaching Aid"; "Technology — Job Opportunities in Industry."

industrial education workshop

Western Michigan University sponsored its Fourth Annual Industrial Education Workshop on Saturday, November 5. Demonstrations were given (in which the spectators participated) on wood finishing, applied welding, automotive tune-up, crystal radio, power mechanics, tumbled jewelry craft, and ceramic tile.

opinion

DOES INDUSTRIAL ARTS COMMAND THE RESPECT OF THE INDUSTRIES IT PROPOSES TO REPRESENT IN SCHOOLS TO SUCH AN EXTENT THAT IT CAN OBTAIN THE CO-OPERATION OF INDUSTRY IN ITS EDUCATIONAL ENDEAVORS?

Asked this question, a random sampling of IA/VE industrial arts supervisors and teachers voted strongly (74 per cent) "yes."

Modifying affirmative answers, one supervisor said "In most cases. Unfortunately, the industrial arts teacher does not always take advantage of what industry really has to offer." A teacher stated that "This is only because industry is willing to offer help to a weak program. It is my sincere opinion that we as industrial arts teachers are not representing industry in our school programs."

Does industrial arts command the respect of the industries it proposes to represent in schools to such an extent that it can obtain the co-operation of industry in its educational endeavors?

Yes	74%	No	26%

Remarks with other affirmative answers: "I'm sure it does. Often I am contacted about the employment of various ones of those who have been my students in industrial arts classes." "We have excellent co-operation from local and area industries." "Closer co-operation between industrial arts and industry will insure the continuation of the respect now enjoyed by industrial arts" "It (industrial arts) has in the past and should continue to secure the respect of industry in our state."

The negative responses included the comment that "It should but does not." Another modified his vote regionally by saying "I would say 'no' for my part of the state; however, I'm told that it does command the respect in the state as a whole." Finally, a negative respondent said succinctly that "Industrial arts is like a modern painting; it's hardly ever recognizable by its title!"

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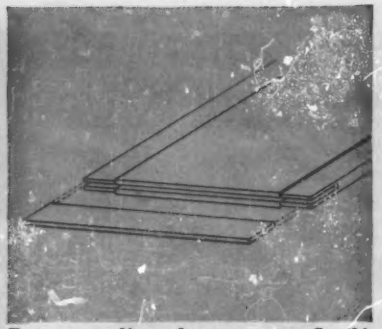

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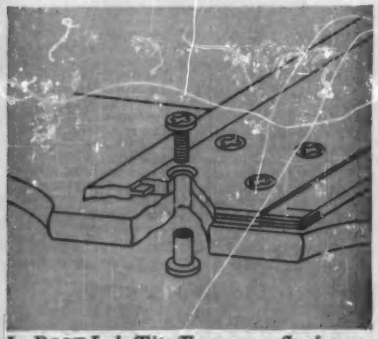

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new books

A Guide to Curriculum Study: Industrial Arts

By Ivan Hostetler and Talmage B. Young. Paper, 54 pp., 8½ by 11 in. Prepared by Curriculum Study, State Board of Education, Raleigh, N. C.

This study guide in the field of industrial arts presents a point of view about the subject that should be a challenge to progressive thinking. It is not intended as a course of study, but as a resource for curriculum improvement.

In addition to the help it can give those who have responsibility for the industrial arts curriculum, it will give school administrators, board members, and lay people in general a better understanding of industrial arts.

Radio-Television and Basic Electronics

By R. L. Oldfield. Cloth, 400 pp., 5¾ by 8½ in., illus., American Technical Society, Chicago, Ill.

This is a comprehensive work for both the beginner and the advanced student of radio, television, and electronics. The first chapters contain a clear and concise discussion of electrical principles which supply the background for the latter chapters.

The book includes subject matter of present significance to even the general reader, such as sections on AM and FM receivers and monophonic and stereophonic high-fidelity systems. Additional features that will be helpful to the reader are the glossary of electronic terms, a list of basic electronic formulas, a conversion table, a list of abbreviations and symbols, and a table of electronic symbols.

Aviation Mechanics for Vocational High Schools

By Philip Becker, William Bristow, and Frank G. Woehr. Paper, 133 pp., 6 by 9 in., illus. New York City Board of Education, Brooklyn 1, N. Y.

Here is a facile text on one of the foremost industries in the United States today. The syllabus presents a three-year sequence of instruction, for grades 10, 11, and 12. Pupils in vocational high schools offering this program are trained as apprentice aviation mechanics. The training is designed to make the student eligible for the Federal Aviation Agency Mechanic Certificate of Competence. The course is correlated with the requirements of the FAA Manual 53, which establishes the standards of the industry.

Applied Teaching Techniques

By Gilbert G. Weaver and Louis Cenci. Cloth, 258 pp., 6⅛ by 9¼ in., illus. Pitman Publishing Co., New York, N. Y.

The authors write with the undisputed assumption that there is no substitute for experience in the teaching field. But they point out that a text like theirs can be a great help to a teacher in that it can save time and energy and prevent wasteful errors. The book is intended for teachers of industrial arts, vocational education, technical education, and teachers in junior and community colleges.

In considering the "teaching triad" (the three areas of competence for a teacher), the authors stress the aspect of the actual teaching of the occupational skills with which the teacher is presumably professionally familiar.

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deaths . . .

▸ *Merrill C. Hamburg,* in Detroit vocational education for many years, died recently of a heart attack. He was 64. He was a vocational teacher in the public schools from 1924 until he became a supervisor for the Board of Education in 1942, a post he held at the time of his death.

Mr. Hamburg was active as a judge and director of the inter-National Model Plane contest until recent years. He founded the first national model airplane organization and supervised the first national indoor and outdoor model contests.

appointments . . .

▸ *Dr. Everett R. Glazener,* now teaching at Colorado State College, Greeley, was formerly with the Arkansas A. & M. College at College Heights, Ark.

▸ *Dr. George Brown,* who had been on leave from his position of assistant professor of industrial education at Southwest Missouri State College, Springfield, Mo., received his Doctor of Education degree on August 5, 1960, from the University of Missouri, Columbia. He is at present Associate Professor of the Industrial Education Department at Southwest Missouri State College.

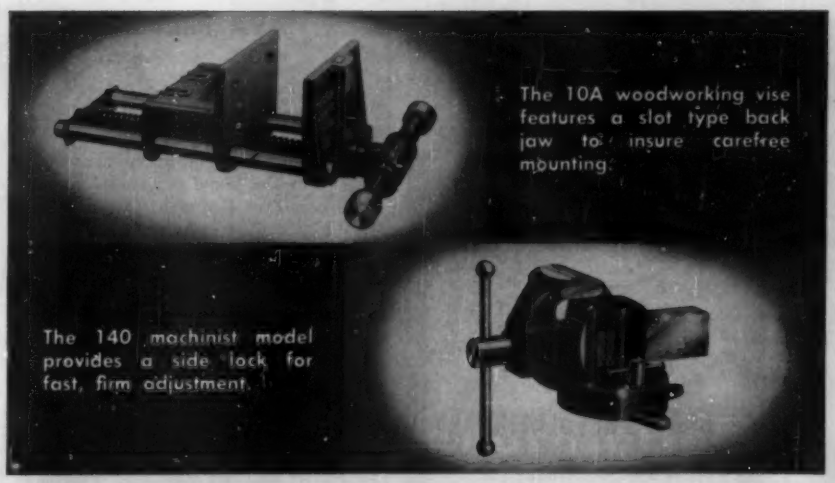
▸ *Donald Smith,* to the position of instructor in the area of electronics at Long Beach (Calif.) State College, left vacant by Russell Journigan, assistant professor of industrial arts, who is on a leave of absence working with the Department of Industrial Education for the California State Department of Education in the Los Angeles office.

▸ *William J. Schott* of Wilmington, Del., has been named director of vocational education for the Somerset, N. J., schools. Dr. Schott was formerly state director of trade and industrial education in Delaware.

▸ *Gordon O. Johnson,* formerly supervisor of industrial education in the State Department of Education in Missouri, has joined the staff of Western Michigan University as Trade and Industrial Teacher Trainer. As a member of the Industrial Education Department he will devote his principal effort to the development of the Vocational-Industrial Teacher Education Program.

▸ *Dr. Walter E. Brown,* as co-ordinator of industrial arts and vocational education for the Phoenix (Ariz.) High Schools and Phoenix College District. He was formerly associate professor of industrial education at the University of Missouri; and in addition, he had been a local co-ordinator of co-operative occupational education, and has served as Missouri's state supervisor of industrial education.

▸ *Dr. Lauro Wilhelm,* director of one of 22 technical schools in Brazil, is spending this semester at Long Beach (Calif.) State College, studying its industrial arts program under the sponsorship of the U. S. International Co-operation Administration (ICA). He is observing American methods of teacher training, and plans "to implement some of our ideas into the Brazilian educational system." He is from Curitiba, the capital of Parena, a state in southern Brazil. His specialty lies in the training of industrial arts teachers for vocational and technical schools. He is also co-director of the only technical teacher training program in Brazil. When he returns home, representatives of other Brazilian technical schools will study the program at Curitiba.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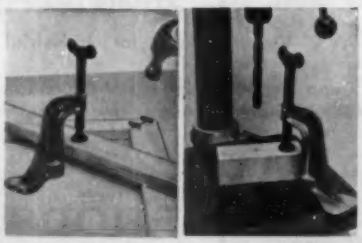

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AVA PREVIEW

(Concluded from page 27)

ematics in the industrial arts program, equipping and supplying the industrial arts program.

On Thursday morning, a joint meeting with the home economics division will hear Mrs. Georgiana Hardy, former president and member of the Los Angeles, Calif., City Schools, speak on "Leadership for Quality Instruction" and William H. [illegible] associate Professor, UCLA, speak on "Selection of Teachers for Quality Instruction." The meeting will be chaired by Verne L. Pickens, assistant superintendent, division of practical arts and vocational education, Kansas City, Mo., City Schools.

On Thursday afternoon, "The Shop Classroom of the Future" will be discussed by Glenn D. Warrick, supervisor of industrial arts for the Long Beach, Calif., City Schools and James D. Finn, president, Department of Audio-Visual Education, NEA and professor, USC at Los Angeles. There will also be seven "Teacher Demonstrations: Teaching Devices and Methods" under the chairmanship of Glenn Newhouse, supervisor, industrial education, Oakland, Calif., City Schools.

The division's program will conclude on Friday morning with A. B. Nadel and Donald R. Little, psychologist and physicist, respectively, technical military planning operation, defense electronics, division, General Electric Company fathoming the topic, "The Uneasy Relationship Between Men and Machines."

John A. Jarvis
AVA Vice-President for Industrial Arts
Dean, School of Industrial Education
Stout State College, Menomonie, Wis.

associations

NEW ENGLAND I.A. TEACHERS CONVENTION

The twenty-third annual Convention of the New England Industrial Arts Teachers Association was held at Wentworth By-The-Sea in Portsmouth, N. H., on October 14 and 15, 1960.

Friday morning's program featured tours to the U. S. Naval Base and the U. S. Air Base in Portsmouth, the General Electric Company in Somersworth, the Clarostat Manufacturing Company in Dover, and the Simplex Wire and Cable Company in Portsmouth.

On Friday afternoon Dr. Donald Maley, head of the industrial education department of the University of Maryland, presented an address on "Crucial Issues Facing Industrial Arts." Round table discussions followed.

New officers for 1960–61 are: president, John B. Nay, New Hampshire; vice-president, Edmund Medeiros, Rhode Island; secretary, Edward P. Stach, Connecticut; treasurer, H. Ward Manghue, Massachusetts; second vice-presidents and state chairmen: Raymond Miner, New Hampshire; Earl Hanson, Massachusetts; Neal Ward, Maine; Stanley Anderson, Rhode Island; William Whitman, Vermont; and Russell Anderson, Connecticut.

The 24th convention will be held in Rhode Island. Time and place to be announced later.

INDIANA INDUSTRIAL EDUCATION ASSOCIATION

Newly elected officers of the Indiana Industrial Education Association are: president, Frank G. Moore, Kokomo; first vice-president, Dr. Lewis Yoho, Terre Haute; second vice-president, Leon Hunt, Indianapolis; and secretary-treasurer, A. A. Himelick, Kokomo.

Their 1961 convention will be held on April 6 to 8, at the French Lick Sheraton Hotel, French Lick, Ind.

INDUSTRIAL ARTS CONFERENCE

A joint conference was held in Buffalo on October 21, 1960, for the Industrial Arts Teachers and Industrial & Vocational Teachers. The State University of New York College was host.

The theme of the conference was "Guidance and the Teacher."

Harold L. Munson, University of Rochester, addressed the morning session on "Relationships, Responsibilities, Resources." Included during the day were visits to the commercial exhibits and through the industrial arts shops where the theme was carried through in terms of vocational guidance as it can be done by industrial arts teachers.

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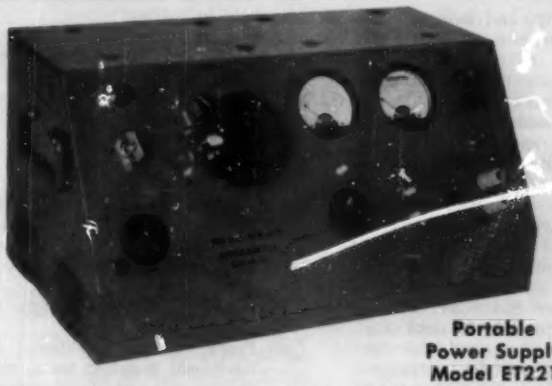

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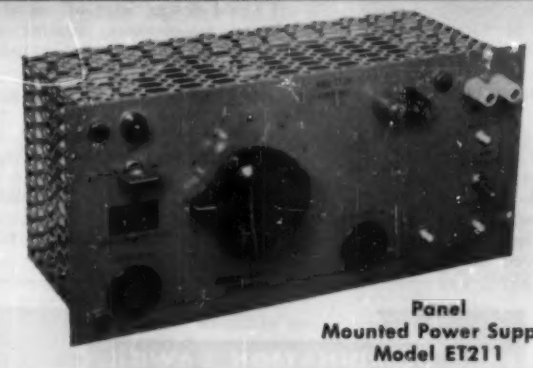

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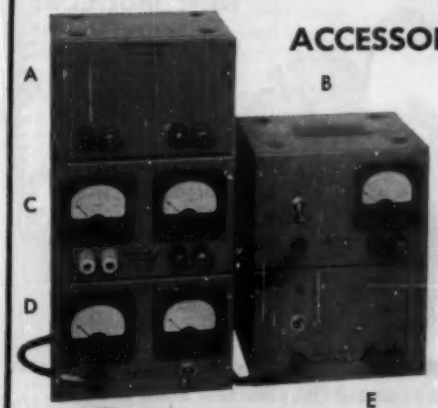
Model ET211
Accessory ET215 provides complete voltage metering



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(Concluded from page 14)

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   a) Cleaning and polishing wood surfaces, painted or varnished; proper sharpening of hand and power tools.
7. Selecting and buying tools for woodworking hobbies.
   a) Standard brands as a guide, individual and multi-purpose tools — which to choose?
8. Projects that can be constructed at home.
   a) Furniture, shelves, birdhouses, toys, workbenches, garden fences, trellis.

GENERAL ELECTRIC

1. Selecting a career from facts learned in the general electric shop.
   a) Occupations in power plant, manufacturing of electrical products and power distribution.
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3. Products of the electronic industry.
   a) Power plants, electrical home and industrial appliances, nuclear electronic components.
4. Recognition of good design, quality workmanship, and evidence of safety considerations.
   a) Importance of safety devices and adherence to national and local underwriters' codes.
5. Factors to consider when buying electrical home appliances.
   a) Well constructed, properly labeled by licensed underwriters laboratories, simplicity in use, and ease in repairing and maintenance.
6. Proper care and use of electrical products.
   a) Using heater and power extension cords properly, maintaining electrical motors, and the use and care of switching arrangements in the home with special emphasis on safety wiring.
7. Selecting and buying equipment for electronic hobbies.
   a) Necessity for underwriter's labels, evidence of safety tests in guarantees. Mail order houses for kits and components.
8. Projects that can be made at home.
   a) Radios, televisions, testing devices, motors, electrical games, scientific experiments.

GENERAL METAL

1. Selecting a career from facts learned in the general metal shop.
   a) Occupations in the sheet-metal industry, foundry and transportation industries.
2. Personnel employed in the metal-working industries.
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4. Recognition of good design and quality craftsmanship.
   a) Proper use of traditional and functional design in metal work. Proper use of fastening and holding devices with special emphasis on finished metallic surfaces.
5. Factors to consider when buying products made in the metal industries.
   a) Good design, ease of operation and maintenance, weather and heat resistant finishes, standard brands as guides.
6. Proper care and use of metal products.
   a) Necessity for lubricating and cleaning, care in the use of tools for making adjustments.
7. Selecting and buying equipment for metal hobbies.
8. Projects that can be made at home with little equipment.

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research

TRENDS IN INDUSTRIAL ARTS DESIGN

Design is inherent in all things fashioned by man. It has come home to us in the field of industrial arts because of our use of the project as the core of our teaching. Frequently the entire program is judged, rightly or wrongly, by the project, its appearance and design. Through the years some teachers of industrial arts have become aware of the need for and the challenges of design. The people of the United States daily view well-designed articles. Millions of dollars are spent annually for designers to work on every sort of product. Perhaps this is something deserving our attention.

What recent research has been done in this area?

Robert Tinkham[1] reported that there are two large-scale movements which are significant in a study of industrial arts design: the modern movement in education and the modern design movement. He found that very few individuals in the industrial arts field have sensed the signficance of modern design as it applies or could apply to this area of the schooi curriculum. The approach to design was found to be usually superficial rather than fundamental. Design is not the application of pat formulas or rules, but a natural step in arriving at an honest and functional solution.

Industrial arts students should be encouraged to do their own designing using modern methods. The findings tend to indicate that industrial arts students prefer to design their own projects.

Writers of industrial arts design texts and references tend to overlook design training for secondary school pupils. There are no books available today that present an adequate picture of today's design. We in industrial arts are still trying to solve design problems with a set of rules and a philosophy which was based on design in the handcraft period. This is the Machine Age. Evidence points out that in school shops all over the country, the basic concepts of the new design are ignored completely.

Industrial arts instructors agree that instruction in design is one of their objectives, yet many felt unprepared to teach it. Tinkham found that many teacher-training institutions do not require design courses though most institutions he contacted felt project design could be improved.

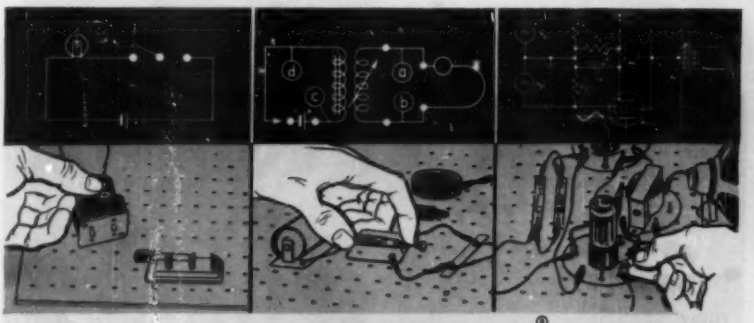
Mr. Tinkham discussed procedures for introducing and teaching aspects of design as a part of industrial arts classwork. In brief, he suggested that beginning pupils should have the opportunity to become familiar with the rudiments in a certain shop area before they are asked to design their own projects. Therefore, it is wise to allow these beginning pupils to select their early projects from a set of well-designed plans and introduce design by class discussions of the plan.

After some experience in an area is gained, pupils are ready for simple design projects. Tinkham suggests that the instructor announce to the class what the design problem will be, for example, a book end. Pupils begin thinking about the problem and class discussions are held from which a design is developed. The teacher can guide the thinking and discussion by asking leading questions as, how is object used, where is it found, or what materials would be suitable? This sets the design process up as a natural procedure. It is not based upon an artificial set of rules and formulas, but stems from a logical analysis of function supplemented by an understanding of tools and materials. Such a procedure will allow and encourage the pupil to go increasingly deeper into the study of materials, functional forms, tools, machines and processes.

The time will come when individual members of the class have gained confidence in solving design problems. At this point the instructor should require individual solutions by pupils.

— William Spence
Associate Professor of Industrial Education
Western Michigan University, Kalamazoo

[1]Tinkham, Robert H., "Design in Industrial Arts," Ph.D. Thesis, University of Minnesota, 1952.



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A PROGRAM FOR PRINTING WEEK

In the life and times of Benjamin Franklin we have a heritage for Americans that is without equal in the history of our nation. His esteem does not belong to one particular group or segment of our country; he belongs to the young and old, to every type of industry, to every form of endeavor, and in particular to the students of our schools. His many and diversified activities are shared by students taking part in every subject of our school curricula, particularly those engaged in the graphic arts. No subject in any school has the potential of doing a public relations job as forcefully and as objectively as the graphic arts shop laboratory during Printing Education Week, celebrated at the time of Benjamin Franklin's birthday. In considering how to "sell" industrial arts as an important part of general education, the following suggested program may more than fulfill our expectations.

The objectives of a Printing Education Week program are:

1. To commemorate Benjamin Franklin's birthday anniversary, January 17.
2. To bring forcibly to the youth of America and the nation's schools the democratic principles and wisdom of Benjamin Franklin and his many contributions to our modern way of life.
3. To call attention in the schools to the importance of the graphic arts industry through programs built around "Benjamin Franklin — A Heritage for Americans." Any other suitable theme may be used.
4. To encourage young people to share in the limitless and varied career opportunities afforded by the graphic arts industry.

Program Activities

Some specific program activities include:

1. Award a special Certificate of Merit to a student for his contribution to the Printing Education Week observance during a special school assembly. (Certificates may be obtained, free of charge from the International Graphic Arts Education Association).
2. Arrange with the school librarian for a special display of Franklin's works.
3. Arrange for a display of student printing in the library or in exhibit cases or bulletin boards in the halls.
4. Arrange a Franklin program for a school assembly. An industry representative to address the assembly may be obtained through the local printing trade association or the Printing Week Committee.
5. Arrange for distribution through guidance counselors of literature concerning career opportunities in the graphic arts industry. (Packets available from IGAEA at a nominal cost.)
6. Conduct open house in the school graphic arts shop for other students and teachers during school hours.
7. Hold a dinner for graphic arts students and their parents; have an industry representative address the group; conduct open house in the graphic art shop, distribute guidance literature.
8. Print place mats featuring Printing Education Week for placement on school cafeteria tables for one day's lunch period or for the week.
9. Write an article for the school newspaper concerning Printing Education Week.
10. Conduct a pilgrimage of graphic arts students to Franklin shrines; place a floral wreath at base of Franklin statue.
11. Print bookmarks featuring Printing Education Week for distribution to students through the school library.
12. Arrange for special announcements and a homeroom program on the school public address system concerning Printing Education Week.
13. Arrange for the showing of movies concerning the printing industry during special school program. (Obtain a copy of "Printing — A Future Unlimited" from your local printing trade association, or write to Crown Zellerback Corporation, 36 South Wabash Ave., Chicago 3, Ill.)
14. Publicize to graphic arts students special Printing Week events and arrange

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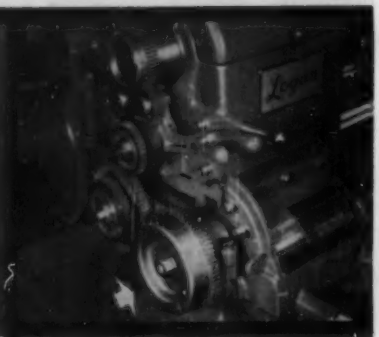

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for their attendance as a group or individually.

15. Arrange with teachers of music, science, English, mathematics, etc., to provide their students with a special printed piece concerning Benjamin Franklin and his contributions to that particular field of knowledge or activity. This may be done as a series of co-operative student projects throughout the year.

16. Arrange a contest in school to select a "Miss Printing Education Week" from among the female students to heighten interest in the school and community.

Integrated Studies

With little research a unit on Benjamin Franklin can be integrated with social studies, English, foreign language, mathematics, science, physical education, public speaking, dramatics, music, art, photography, and safety education. In the industrial arts the integration could be in the areas of electricity, wood, arts and crafts, ceramics, and of course, graphic arts. The entire program could be tied up in a combined school and community project.

Each day of the celebration week should be devoted to a different subject area, sponsored and conducted by an area chairman.

In what better way can we vitalize industrial arts thinking and doing by a complete school and community program that for years has been called the most functional one of its kind in American education?

John M. Fontana
Chairman, International Printing Education Week

GRAPHIC ARTS PROFILE

(Concluded from page 44)

printing industry. Much of this planning, we will find, will center around technical education — post-high school, two-year terminal programs in such schools as technical institutes, community colleges, junior colleges, and area vocational schools. The printing industry has already given thought to such training programs and has prepared a broad description of two types of technicians they will be seeking — the administrative technician and the production technician.

The *printing production technician,* as described by authorities studying this matter, will work in the shop utilizing a variety of instruments involved in determining and specifying quality control standards, register, humidity control, and responsible for determining that the established standards for each job are being met. Depending on the size of the plant, the number of departments, and the number of employees involved, a printing plant may have one or more such technicians, or these technical responsibilities may be part of the front-line supervisor's function. Regardless of the duties assigned him, he

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must constantly be mindful of the production problems involved in placing ink on paper, and must be prepared to specify the best ways to do it; he must keep up-to-date on new techniques and new materials; he must be cost-minded and aware of the best work-simplification procedures; he must be able to write instructions and communicate verbally with the people in the shop; his records must be accurate, and he must constantly study these records to be able to develop specific techniques and procedures for keeping production at a high level consistent with the quality demands of management; and he must be intimately familiar with the use of the many technical instruments available in the plant for judging and controlling quality, etc.

The *printing administrative technician* is involved in the handling of the tools and instruments concerned with such specific functions as estimating, cost control, production control, inventory control, traffic control, and such other front office duties not concerned with the various professions of accounting, sales, finance, personnel management, office management, etc. (Although we recognize the need for office management, methods analysts, and personnel management technicians, e.g., aptitude and intelligence test administrators, we are not including these technicians in our discussion of operations peculiar to printing plants.) Our printing administrative technician knows how to specify and order paper, ink, plates and other supplies connected with the production of a specific printing job; he is intimately familiar with the various printing production processes so as to be able to determine and specify which printing process to use for a specific job; he knows how to measure and scale copy; he knows production capacity of the various machines in the plant; he is able to use the slide rule and the various tables and charts to estimate time factors and costs of production for different types of printing jobs; he is able to figure out how much ink is needed for any particular job to be printed; he is able to use the PAR Tables of Printing Industry of America and has as his "bible" such other Printing Industry of America texts as "Printing Production Management," "Estimating," and "Cost Accounting," and "Managing Your Business."

The printing industry is well-known for the high annual earnings of its craftsmen and its ranking as one of the ten largest industries in the United States. Not so well known is the fact that the industry ranks among the top five of all industries in terms of numbers of salaried employees and weekly earnings, and that it is slated for continued growth, according to the United States Department of Labor, "as a result of population growth, expansion of the American economy, and the tendency toward relatively greater use of printed material for information, advertising, and various industrial and commercial purposes."

The technological developments affecting the printing industry today will be accelerated at an ever-increasing pace during the next few decades. While these new developments will require new kinds of highly trained, specialized personnel, as well as professionally educated managerial personnel, there will also be a greater need for higher levels of craftsmanship in every phase of printing plant operation. No matter what the changes may be in the technology and the manpower of the printing industry, we can look foward to an industry which will continue in the tradition of over five centuries of service to our growth and welfare.

The author acknowledges his indebtedness for information on the technological developments occurring in the graphic arts industry to the many authorities who prepared articles for publication in "Printing Progress," published this year by the International Association of Printing House Craftsmen.

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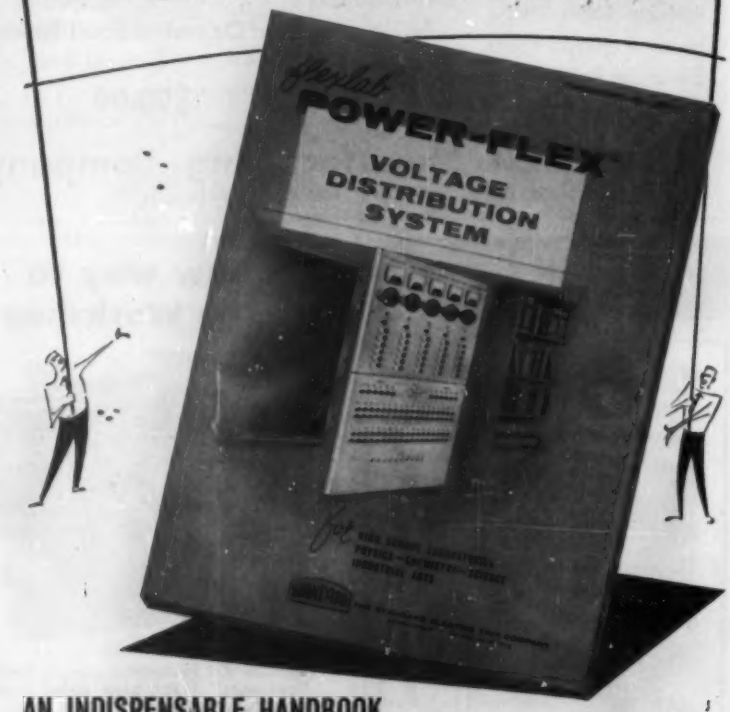

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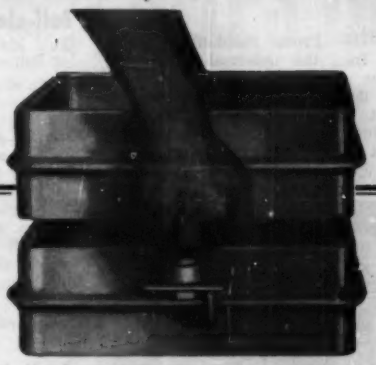

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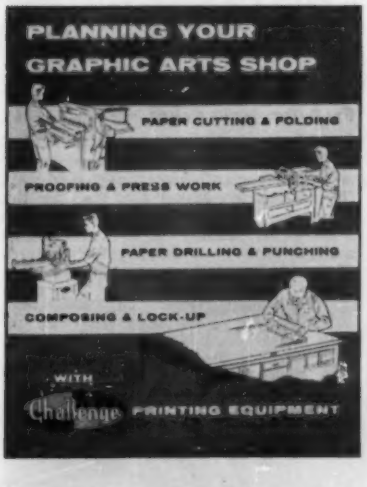

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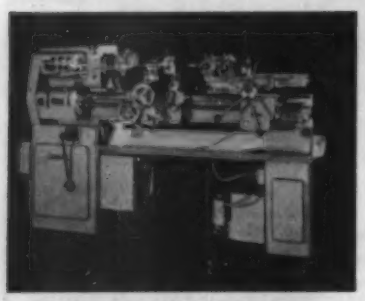
equipment

turret lathe From Sheldon Machine Company, Inc., the universal ram type turret lathe — the Sheldon 3R Turret Lathe — is designed to meet the need for a low cost, all purpose production tool. Equipped for turning between centers and single point threading in addition to standard turret operations, the lathe has ample



Sheldon 3R Turret Lathe

clearances to permit a wide variety of work to be machined. Bar capacity 1⅝ in., swing over bedways 15 in., and swing over cross-slide 8 in. These clearances permit the lathe to be used as a chucking machine as well as for bar work. The turret is equipped with a power feed box for increased accuracy and finish of machined parts. Power feeds are engaged electrically by pressing pushbutton controls. Turret travel is 30 in., and each turret face is bored to accommodate 1½-in. standard shank tooling and also to permit passing bar stock completely through the turret head. Sixteen spindle speeds from 22 to 1250 r.p.m., are available through the 5 h.p. two speed geared motor.

(For further details encircle index code 1001)

micrometer depth gauges From The L. S. Starrett Company, this new series of micrometer depth gauges, featuring a short half base designed to facilitate depth gauging close to shoulders or between obstructions where full base gauges will not go. Available in three size ranges — 0 to 3 inches with three rods, 0 to 6 inches with six rods, or 0 to 9 inches with nine rods. Sleeve and thimble on the No. 443 Series Micrometer Depth Gauges have no-glare satin chrome finish, graduations are in thousandths of an inch, screws precision ground with 1-in. movement and the

Micrometer Depth Gauge

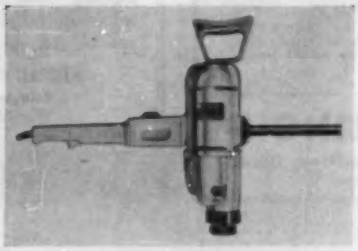
base is hardened, ground, and lapped. Ask for New Tools Bulletin No. 143.

(For further details encircle index code 1002)

full-closing C clamps From Wilton Tool Manufacturing Company, Inc., a line of full-closing, super-duty C Clamps in sizes up to 12½ in., bringing the total number of complete series up to eleven — the largest number of complete series in the C-Clamp field. There are nine clamps in the series with the capacities ranging from 0–1¼ in., in the smallest clamp, to 0–12½ in., in the largest. Minimum proof test varies from 5600 lb., to 40,000 lb. The frames are forged carbon steel and heat treated. Each screw is machined from a single piece of square, cold drawn alloy steel, hardened and tempered. Clamps are shipped in the natural steel finish.

(For further details encircle index code 1003)

ball bearing drill From The Black and Decker Manufacturing Company, a 1¼-in. heavy-duty ball bearing drill equipped with synchro-mesh transmission which instantly changes the spindle speed

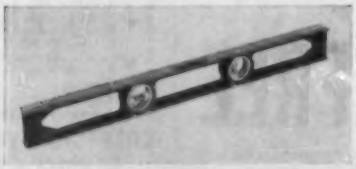


Two-Speed Reversible Drill

of this unit, even while the tool is operating, from 500 to 250 r.p.m., no load speed. The 2-speed feature is useful in many operations. Also equipped with reversing switch, the tool can be used for operating speed reducers, hoists, elevators, and similar basic power operations. Equipped with a Black & Decker heavy-duty universal motor, extra length switch and pipe handles for full control, automatic release trigger switch, and heavy-duty ball bearings; spindle mounted on roller bearings; has a No. 3 Morse Taper Socket, plus additional fine features.

(For further details encircle index code 1004)

aluminum levels From The Columbian Vise & Mfg. Company, two lightweight aluminum levels of 18- and 24-in. lengths known as No. 2518 Compact (shown) and No. 3524 Compact. Both levels have die cast frames with strong, reinforced ends. Frames are attractive blue with bright machined working edges. Top edge is ruled with ⅛-in. calibrations. No. 2518 has 1 plumb and 1 level and weighs ¾ lb., No. 3524 has 2 plumbs and 1 level, weight 1 lb. Vials of cat's-eye metallic-sealed type, eliminating possibility of tip breakage. They are protected on both sides by

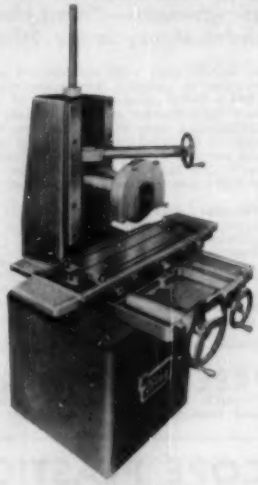


Aluminum Level 2518 Compact

newly-designed plastic guards and are packed in Certified "Levelpack" cartons. Further details available.

(For further details encircle index code 1005)

surface grinder From King Machine & Mfg. Company, a manual-control surface grinder, Model K-1020, for either wet or dry sanding, with longitudinal table travel of 20 in., and a 14-in. cross

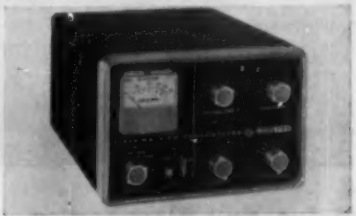


Model K-1020

feed. Grinding wheel diameter 12 in., allowing a 15-in. vertical clearance over the table. Tee-slotted table travels on precision ground ways and has adjustable table stops. It features a 10 by 20-in. working surface when used for wet grinding. The King grinder has a direct-drive spindle, rotating on pre-loaded precision ball bearings, powered by a 1½ h.p. balanced motor. Magnetic chucks and other accessories.

(For further details encircle index code 1006)

transmitter From Electronic Instrument Company, a compact, rugged 60-watt CW transmitter, Model 723, ideal for the novice or for the advanced ham needing a low-power standby rig, it is available as a kit, or factory wired and tested. Features of the 723 include: a one-knob bandswitch



EICO Model 723 Sixty Watt CW Transmitter

covering 80, 40, 20, and 15 and 10 meters, and a one-knob off-standby-tune-transmit switch; a panel meter which can be switched into either grid or plate circuit of final; and a modulator/accessory socket for modulator input, antenna relay, VFO power take-off, and emergency power input. Effective TVI suppression is achieved through filtering and by-passing. Mounted on a copper-plated chassis, and with a solid die-cast bezel providing tight-fitting joint between panel and chassis, the entire unit is characterized by EICO's customary engi-

neering. Weight 15 lb.; size: 6 in. high, 8½ in., wide, and 9 in. deep.

(For further details encircle index code 1007)

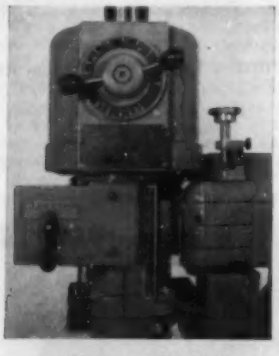
automatic saw filer From Foley Manufacturing Company, Model 200 automatic saw filer which files combination (rip and crosscut) circular saws automatically, and also sharpens hand saws, band saws, and crosscut circular saws. This saw may be used for table sawing, or as a port-

Automatic Saw Filer Model 200 — pedestal mounted

able power saw. The ability of the machine to sharpen combination circular saws greatly increases its utility, not only for woodworking and industrial plants, contractors, builders, manual training departments and vocational trade schools, but for custom saw filing and repair shops as well. The precision and accuracy of automatic machine filing increases the cutting production of power saws greatly.

(For further details encircle index code 1008)

drill presses From Powermatic Machine Company, the new "Select-O-Matic" 20-in. Drill Press, designed to perform both high and low speed drilling operations on one drill press. Incorporating a two-speed

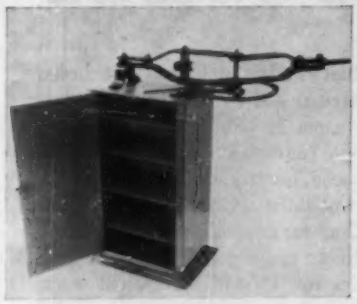


"Selecto-O-Matic" Drill Press

motor with the variable speed drive, this drill press provides a complete spindle speed range (infinitely variable) from 120 to 1750 revolutions per minute, making it possible to perform any drill requirement, from reaming, spot-facing and tapping to polishing and high speed drilling on a single drill press. This same high-low range is also available on the Powermatic 20-in. Step Pulley Drill Press. Using a standard two-speed motor, spindle speeds from 160 to 2100 r.p.m., guarantee operator the most complete speed range of any step pulley drill press.

(For further details encircle index code 1009)

floor stand cabinet From Hossfeld Manufacturing Company, a combination floor stand and cabinet for the Hossfeld No. 1 Universal Bender, the cabinet providing space for storing all dies and acces-



Combination Floor Stand and Cabinet with Bender

sories, and a level, stable work stand for the bender as well. Complete with an all-purpose die set, the Hossfeld Universal bends rounds, flats, squares, angle irons, pipe, tubing and conduit. Equipment included for cold bending has following capacities: standard pipe up to 1¼ in.; bar stock to ⅞ in. round or square, and 3 by 7/16-in. flats; square bends to right angles on stock to 3 by ¼ in.; eye bolts, S shapes, hooks on round or square stock to ½ in.; eyes and sharp square bends within ¾ in. from end on flat stock to ⅛ in. by 3 in.; angle iron flange inward to 9-in. radius, angle iron flange outward to 4-, 5-, 6-, and 9-in. radii on stock to 1½ by 1½ by ⅛ in., ¾-in. o.d. tubing 2-in. centerline radius; scroll 4-in. diameter single turn on stock to 5/16 by ¾ in.; and edgebends on flat stock up to 5/16 by 1 in.

(For further details encircle index code 1010)

band saw From Northfield Foundry & Machine Company, the addition to their band saw line of the new Northfield "De-Luxe 36" Band Saw, embodying 36 by 2¼-in. steel, demountable, reinforced tire disk wheels; a 37 by 37-in. table; 24-in. capacity under the guide; fully automatic

safety brake on upper wheel with automatic tension control; tension indicator; blade tracking guide and lower wheel brake. Available in direct drive with 5,

(Continued on next page)

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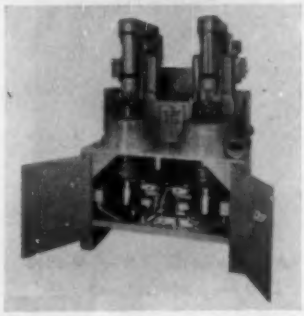
SHOP EQUIPMENT NEWS

(Continued from previous page)

7½, and 10 h.p. T.E.F.C. motors as well as "V" belt driven single, variable, or multiple speed drives adaptable to any cutting operation. Electronically balanced for vibrationless performance, all accessories available in common with other Northfield machines.

(For further details encircle index code 1011)

vertical half-mill From the U. S. Burke Machine Tool Company, a completely new duplex vertical precision U. S. Half-Mill developed for high production rotary milling operations. Designed to mill



Duplex Vertical U. S. Half-Mill

circular grooves to preplanned tapered depths in the production of pump units for automatic transmissions, the compact precision unit is now in operation in the plant of a leading automobile manufacturer. The vertical Half-Mill automatically processes two parts at one time. The workpieces are held in the centers of the independently powered rotary tables by means of air actuated "elevator type" clamps. The tables rise until the parts hit locators and start the automatic cycle. Release at completion of cycle is also automatic, after the clamp descends with the part. Complete details and specifications on various duplex precision U. S. Half-Mills are available from the manufacturer.

(For further details encircle index code 1012)

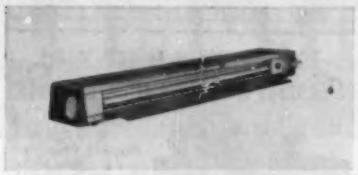
automatic typewriter From Royal McBee Corporation, the new Royaltyper "single-system" automatic typewriter, designed to type letters automatically at 135 words a minute. Due to the "single-system" feature, the typist can prepare the master tape on the machine itself, simply by typing a visual copy of the material to be

Automatic Typewriter

reproduced. The tape is then ready to be fed into the same machine, eliminating the need of a separate punch previously necessary for automatic typewriters. The machine can produce 20 letters an hour. The Royaltyper is available in two models—the File-Tape Royaltyper, using tape in the "flat-pack" form, permits unlimited selection of paragraphs, and the Spool-Tape Royaltyper which offers all the advantages of the slightly more expensive File-Tape model except for permitting paragraph selection. Both models consist of a tape reader, an integral punch, and a new Royal electric typewriter. Models can be bought or leased through Royal McBee.

(For further details encircle index code 1013)

copymaster printing unit From Copymation, Inc., this newly designed compact table or wall mounted 44-in. whiteprinter for architects, engineers, school and office use, has a variable printing speed range up to 10 ft. per minute controlled



Copymaster Whiteprinter

by a single knob with full reverse feature. The printing unit is housed in 18-ga. steel finished in baked-on harmonizing office colors, 6¼ by 9¼ by 58½ in., over-all weight 80 lb. Three replaceable black light fluorescent lamps provide the light source. The unit plugs into a standard electrical outlet. The developing chamber, made of aluminum, is 4 by 4 by 55¼ in., weight 4 lb. The Copymaster introduces a new concept in print developing with a horizontally mounted, self-sealing chamber which processes several prints simultaneously.

(For further details encircle index code 1014)

dynamic cardioid microphone

From Allied Radio Corporation, the Knight Model KN-4550 Dynamic Cardioid Microphone, to be used for all recording and public-address applications requiring clean sound quality. It permits greater freedom of movement for the user since its pickup

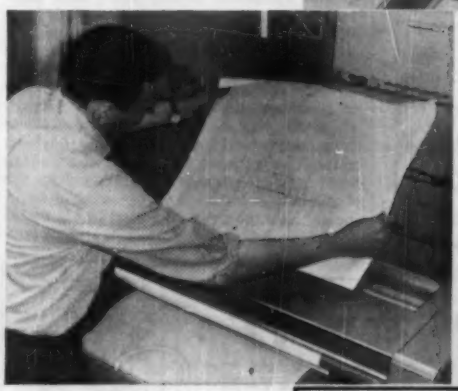
Knight Model KN-4550
Dynamic Cardioid

pattern allows the user to stand up to twice the distance away from the microphone without audible loss of response. Other features: 60 to 13,000 cps; output level —57 db; output impedance adjusted at the con-

The Copyflex 300 is Working Its Way Through College . . . at TULANE

Tulane University's School of Architecture, one of the finest in the country, has a 5-year curriculum in Architectural Design. As a part of the design courses, students must periodically make tracings that can be reproduced and read easily as prints.

At one time, students tested the sharpness of their drawings by having whiteprints made in downtown New Orleans, five miles away. In addition to taking time out from busy schedules, each student was spending an average of $20.00 per year for this service.



The Bruning Copyflex 300 recently installed in the school now makes it possible for students to make top quality, black-on-white diazotype whiteprints in seconds up to 30" wide by any length...right in their own classrooms! Moreover, the cost of prints to students has been slashed in half! Why not make Tulane's experience your basis for investigating the unique, low-cost Model 300 by mailing the coupon below.

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SHOP EQUIPMENT NEWS

(Continued from previous page)

nector for either 150 ohms or hi-z; pressure-cast metal housing features two tuned chambers, and has satin chrome finish; ⅝-in. —27 standard stem threading fits conventional floor and desk stands. The microphone is supplied with on-off switch, 18-ft. mike cable, screw-type connector at the mike; length 7¼ in., listed under Allied Stock No. 93S479.

(For further details encircle index code 1015)

visual communications system

From Minnesota Mining and Manufacturing Company, a new visual communications system which enables a plastic transparency to be made from almost any document in less than ten seconds in normal light and projected immediately in a fully-lighted

Visual Communications System

room. It combines the use of a copying machine and an overhead projector. Called the "Thermo-Fax" brand visual communications system, it involves no special operator training or complicated developing processes and brings a new dimension to speeches, presentations, reports, and group instruction. Making of transparencies is a simple operation. Transparency and original document are merely inserted in a "Thermo-Fax" copying machine and the image is made in about four seconds. The process is completely dry and no chemicals or solutions are needed. The transparency is then immediately ready for projection. Originals may be opaque, transparent or translucent, and printed on one or both sides. The transparencies make clear, sharp images when projected including even the finest detail contained on the original document. New data can be added to old transparencies by running them through the

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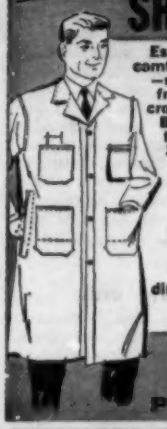

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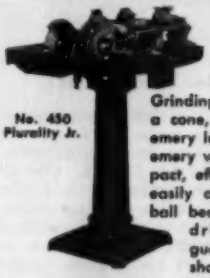

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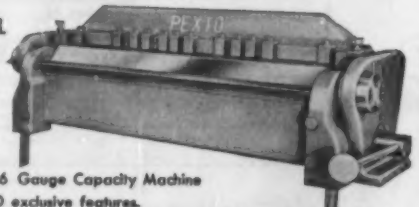

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CORRECTION

An error crept into our write-up in the September issue of IA/VE, page 99, concerning the Desmond Bros., pouring spout. We would like to correct the error. Desmond Bros. make only one product, Deft Wood Finish, and the five gallon container is one of the Deft Wood Finish units.

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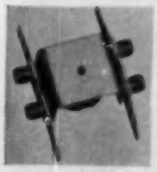

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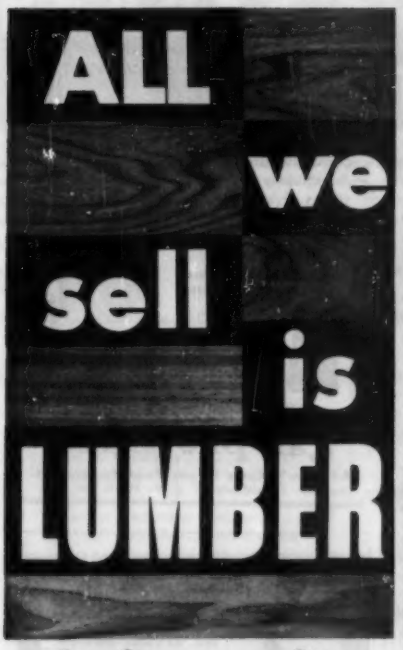

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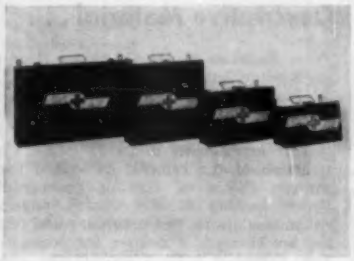
copying machine at any time. The new "Thermo-Fax" overhead projector is a compact unit standing 25¾ in. high to the top of the projection head, 13¼ in. wide, and 21½ in. deep. It weighs 40 lb., uses regular 110-volt current, a 1000-watt lamp for maximum brilliance, and is operated by a single switch. It projects a 10 by 10-ft. image from a distance of 15 ft.

(For further details encircle index code 1016)

first aid kits From The General Scientific Equipment Company, their new line of heavy-duty unit first aid kits designed to facilitate emergency treatment through the use of unit-wrapped items, boldly labeled and arranged for immediate recognition and access. Each G-S Unit-Type Kit has a facsimile index on the inside of the



First Aid Kits

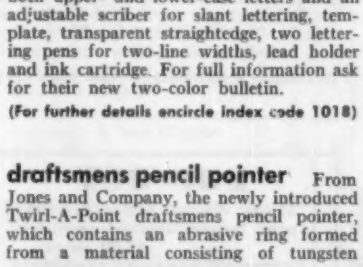
case lid which shows at a glance the exact location of all items and gives concise instructions for their use. The index also serves as a positive inventory control, since any missing items can be quickly identified from the fascimile table. G-S Unit-Type Kits are available in sizes of 10, 16, 24, and 36 units. Cases are made of 20-ga. steel, finished in either olive green or grey baked-on enamel. For complete information ask for Bulletin 305.

(For further details encircle index code 1017)

lettering set From Keuffel & Esser Company, their 8935 Doric Lettering Set, economy priced, designed for professional, business, school, and home use, combining both upper- and lower-case letters and an adjustable scriber for slant lettering, template, transparent straightedge, two lettering pens for two-line widths, lead holder and ink cartridge. For full information ask for their new two-color bulletin.

(For further details encircle index code 1018)

draftsmens pencil pointer From Jones and Company, the newly introduced Twirl-A-Point draftsmens pencil pointer, which contains an abrasive ring formed from a material consisting of tungsten



Pencil Lead in Contact with Abrasive Ring

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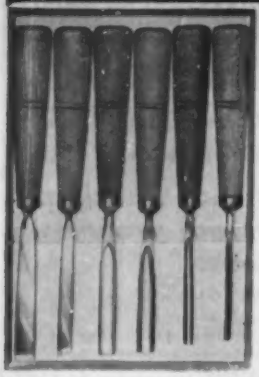

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SHOP EQUIPMENT NEWS

(Continued from previous page)

carbide grits brazed to steel, and a serrated vinyl wiping surface of the correct geometric shape to do an effective job of cleaning the sharpened pencil point. Also it contains a stop plug which both serves to position the pencil longitudinally in the device, and serves as a check valve to restrict the passage of graphite residue from the capped receptacle back into the operating chamber of the device. It generates a point of good proportion, it is clean to use, and it is portable.

(For further details encircle index code 1019)

Descriptive Material . . .

From Eastman Kodak Company, their revised pamphlet — "How To Make and Use A Pinhole Camera," Teacher's Edition, Pamphlet No. T-38 — provides easy-to-follow instructions, diagrams, and ideas for further experiments in its 12 pages. Construction of the camera, its hinged paper shutter, choice of film or photographic paper, loading of the camera, exposure recommendations, and processing and printing are covered. A project for youngsters, this pamphlet offers step-by-step directions for teachers or youth group leaders.

(For further details encircle index code 1020)

From Chicago-Latrobe, manufacturers of a complete line of drills, reamers, end mills, countersinks, counterbores, carbide tools, and special tools, a set of 19 Engineering Prints offered free to shop instructors who make requests on their school letterheads.

(For further details encircle index code 1021)

From Venus Pen & Pencil Corporation, Prize Winning Drawing Portfolios containing reproductions of the pencil drawings of six award-winning young artists in the 33rd Annual Venus Scholastic Contest, available to schools for 15 cents each. The drawings selected from 20 award winners (who competed with some 10,000 entries from across the nation in regional competitions) for the annual drawing art awards, illustrate the diversified interests and techniques of today's young artists.

(For further details encircle index code 1022)

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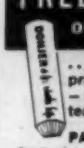

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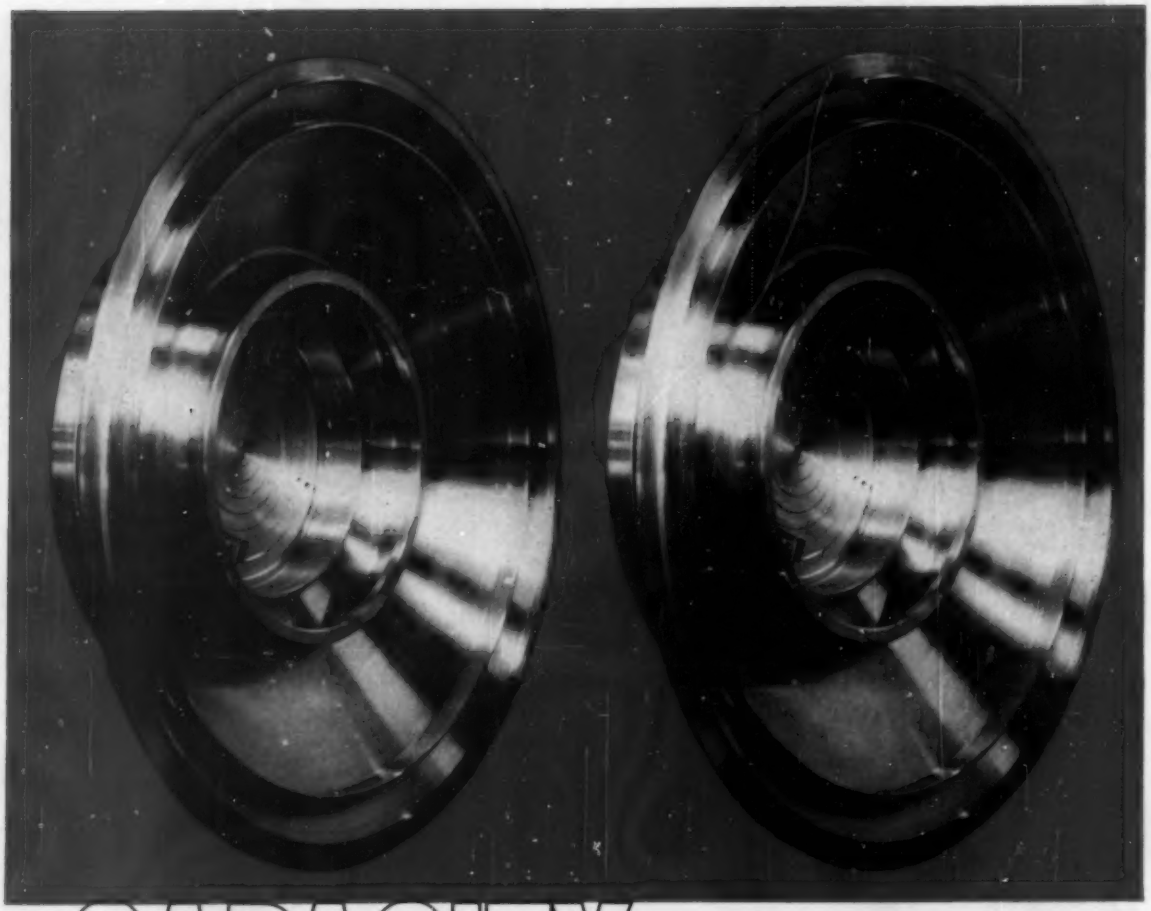

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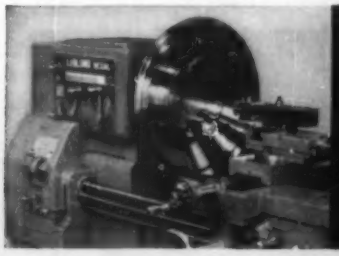

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